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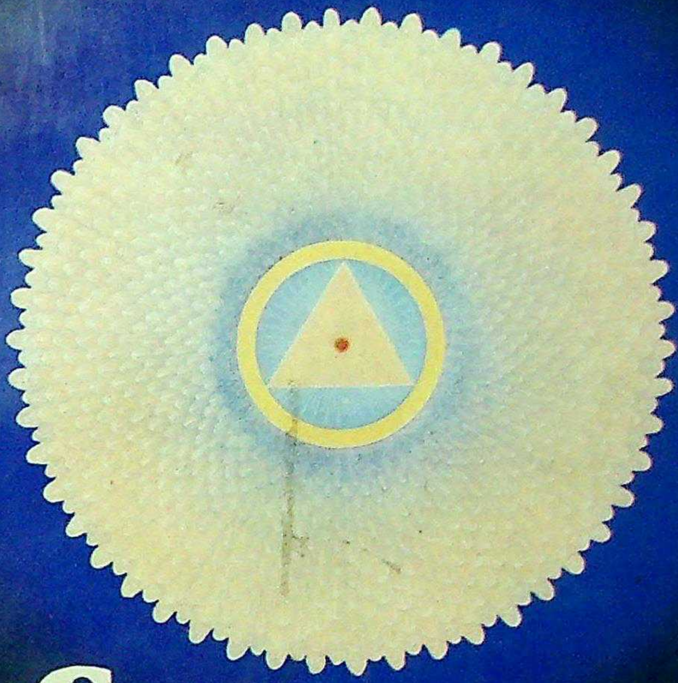

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Sanskrit and Computer-based Linguistics

Proceedings of the Seminar on
'Knowledge Representation in Sanskrit & Allied Semantic Theories'
Bangalore March 6-7, 1993

पुस्तकालय
गुरुकुल कांगड़ी विश्वविद्यालय

Editors

M A S Rajan, M.Sc., & S H Srinivasan, Ph.D.

Academy of Sanskrit Research
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OVERVIEW

M.A.S. Rajan & S.H. Srinivasan

This volume contains the talks and papers presented at the seminar on Knowledge Representation in Sanskrit and Allied Semantic Theories. The seminar was organized by the Academy of Sanskrit Research, Melkote. The principal objective of the seminar was to provide a platform where birds can flock together though of different feather - in this case, computer scientists and Sanskrit scholars - to warble in harmony. In more concrete terms "... to understand the idioms and terminology of the Sanskrit scholars and identify appropriate equivalents in the language of computer science ... [and] to examine the type of research effort that needs to be pursued by classical scholars and computer scientists alike to develop a system of computational linguistics and knowledge representation with a firm base in Sanskrit texts".

The Background

Why should we expect that the study of Sanskrit texts can illuminate issues in Natural Language Processing (NLP) and Artificial Intelligence (AI)? An immediate answer to this question is: Sanskritists seem to have asked and answered - nearly two thousand years ago - the same questions that (computational) linguists have been asking only after the birth of computers. Since the original questions have been posed in a vastly different context, the significance of the Sanskritists' contributions are becoming apparent only after these questions have been posed in a computational setting. Hence if points of concurrence in concerns and terminology can be achieved, one can look ahead and interpret some of the Sanskrit texts so that we don't have to wait for computational linguistics to bring the issues to sharper focus.

Having said that, it is necessary to list the already appreciated contribution of Sanskrit texts. For that we will first give a concise account of the available Sanskrit texts. This will also facilitate better appreciation of some of the papers

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because they extensively quote from the texts. The oldest of the Sanskrit texts are the Vedas which are said to be coeval with the creation itself. They are four in number : *Rg, Yajur, Sâma,* and *Atharva*. Most of the Sanskrit texts concede complete authority to the Vedas and merely propose to clarify the points raised there. Six fields of enquiry - four of which are directly related to linguistics are so closely related to Vedas that they are called *Vedângas*, - literally, "limbs of Vedas". They are phonetics (*sikṣâ*), grammar (*vyâkaraṇa*), etymology (*nirukta*), prosody (*chandas*), astronomy and geometry (*jyotiṣa*), ritual codes (*kalpa*).

Two important texts in the above disciplines are a text on etymology by Yâska - Nirukta and a text on grammar by *Pâṇini* - *Aṣṭâdyâyî*, also known as *Pâṇini* sutras.

Apart from these fields of enquiry, there are also six systems of philosophy called the six *darsanas*: *Nyâya, Vaiśeṣika, Yoga, Sânkhya, Pûrvamîmâmsa,* and *Uttaramîmâmsâ*. Of direct relevance to computational formalism are the *Nyâya* and *Purvamîmâmsâ* (henceforth, just *mîmâmsâ*) systems. The *Nyâya* system corresponds to logic and the *mîmâmsâ* system to hermeneutics (theory of textual interpretation).

We now trace the existing parallels between notions in Sanskrit texts and computational linguistics. A cynosure of Sanskrit linguistics is the *Aṣṭâdyâyî* of Pâṇini. This text outlines a grammar for Sanskrit. This is in the form of terse aphorisms or Sutras. To keep the size of his work as short as possible so that the text can be preserved in the most volatile medium - human memory - Pânini uses a number of devices some of which are the following: *Adhikârasûtra* or meta rules which have well-defined domains of application; *Samjñâ* or a concise coding system. The grammar formalism is generative and rule-based (with context-sensitive rules). Using the rules, it is possible to generate all and only the grammatical sentences. *Pâṇini* also makes use of ordering restrictions as a meta-device in the generative formalism. Most of these notions anticipate the current techniques used in rule-based systems.

Another major contribution of *Pâṇini* is the distinction between surface or syntactic cases (*vibbaktis*) and deep or semantic cases (*kârakas*). This distinction was brought forcefully to the attention of linguistics by Charles Fillmore in 1968.

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Another important idea, of independent interest, prevalent in Indian linguistics is that grammar should only try to describe rather than prescribe language usage.

While Pânini's grammar takes care of syntax, there are two notions relating to semantics that are relevant. These two are related to the questions: How do the individual word meanings relate to the meaning of the sentence? What is meant by the cognition of a sentence?

Relating to the first question, there are two views: the *abhihitânvaya* and *anvitâbhidhâna*. The former says that words express their individual meanings first through their own capacity and it is only later that they combine together (mutually agree with each other) to produce sentence-meaning. The latter posits the view that the meaning of words mutually depend on each other. It is interesting that the former compares with the symbolic approach to language and the latter with the interactive and emergent nature of connectionist representations.

Whatever be the process of comprehension, what is the nature of ultimate sentence cognition? This is the theory of *śâbdabodha*. Consider, for example, the sentence: Caitra worships Hari. How is sentence (meaning) cognition produced? One version of the *śâbdabodha* is the following: Caitra is the substratum of activity favorable to love which has Hari for its object. Śâbdabodha of more complicated sentences decomposes objects and events to more primitive terms. It is not difficult to notice the fact that the motivation for *śâbdabodha* and the more recent conceptual representation of sentences is the same: to make the semantic relations in a sentence more explicit and to use primitive concepts in the representation. This parallel was popularized by Richard Briggs in 1985.

The theory of *śâbdabodha* is not without controversies. There are three schools of *śâbdabodha* corresponding to the entity that is given prominence. The logician's (*naiyayika* - corresponding to *nyâya*) version gives prominence to the noun in the nominative case. The example given above corresponds to the *naiyâyika śâbdabodha*.

The grammarian's (*vaiyâkaraṇa*-corresponding to *vyâkaraṇa*) version gives importance to the activity and runs as follows: worship where Caitra is the substratum and Hari is the object. The third *śâbdabodha* corresponding to the

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mîmâmsakas - adherents of *mîmâmsa* philosophy - considers the productive activity or productive urge to be primary in a sentence. The *mîmâmsakas śâbdabodha* is: activity subsisting in Caitra which is favorable to love subsisting in Hari.

Debates have raged between Sanskrit scholars for ages regarding the veridicity of the three *śâbdabodhas.* Far from resolving the case, we dissolve it thus: it is possible that two types of representations exist: object-centered and activity-centered. The object-centered representation abstracts certain details. For example, the object-centered representation of "tree" involves concepts like leaves, branches, etc. An activity-centered representation includes its ability to bend etc. The activity-centered is more detailed and is invoked after "breakdown" of object-centered representation. It is possible that these two representations to be mutually recursive. It may also be that different hemispheres of the brain are involved in these representations.

This introductory part may be closed with a brief account of the *mîmâmsa* system. The *mîmâmsa* system was evolved to arrive at correct interpretation of Vedic injunctions on rituals. As mentioned before, a major aim of all these texts is to make adherence to Vedic injunctions as strict and complete as possible. Partial fidelity may be dangerous. There is a story of a sage who performed a rite for a son to kill Indra. The son was killed by Indra since the word Indrasatru - which can mean "slayer of Indra" or "one slayed by Indra" depending on the accent - was pronounced the wrong way during the ritual. While phonetics and grammar take care of the linguistic part, the *Mîmâmsasûtras* take care of the intention expressed in the passage to find the suitability of being prescribed for the actual ritual part. The relevance of *mîmâmsa* to NLP lies in the belief that it may be possible to abstract useful discourse interpretation rules from *mîmâmsa* texts.

The Seminar : a summary

We trust this account of the background, though all too brief, will help in the appreciation of the talks and papers presented at the seminar. The proceedings given herein contain edited versions of the talks delivered and the texts of the papers presented. Their sequence has been reordered to reflect the topical affinity.

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To our great regret the team of youngsters entrusted with the tape-recording of talks over-estimated their mastery over the technology and we lost more than one valuable presentation. For example, the general remarks at the inaugural session made by Prof. D.K. Subramanyam and by Dr. M. Vidyasagar were irretrievable, as well as the observations of Dr. P.K. Mukhopadhyaya and Vidvan K.V. Ramakrishnamacharyulu at the concluding session. Likewise several other parts of the proceedings notably the extempore talk of Vidvan Ramanuja-tatacharya were deprived of the benefit of the recording system. However, what we got out, through writings and available recordings, we believe is of some value and utility.

The first part is introductory and has two talks of general nature, the second part consists of three papers which review the work on Natural Language Processing, while the third one contains eight papers which deal with the linguistic concepts in Sanskrit. The next part looks at various parallels between computer science and Sanskrit linguistics, and the fifth and last part presents conclusions and includes an account of the Panel Discussion. At the end, a Sanskrit portion contains the original texts of the papers presented in Sanskrit whose translations have been included in the third part.

The volume begins, in its introductory part, with the address of Mr. M.A.S. Rajan, President of the Academy, which sets the intended agenda of the seminar. As the reader would find from the proceedings, several of the ambitious objectives were not fulfilled, but some useful ones were intensively discussed. To cite only two examples of the objectives fulfilled, many of the ideas from the arena of Sanskrit vidvâns, which are couched in idioms and terminology of that environment, were expressed at the seminar in language and imagery familiar to computer scientists; and thereby a beginning was made to enhance the communication between the two schools of linguistics. Again, ideas were put forward and discussed as to the lines on which more purposeful research can be undertaken. And so on.

At the inaugural session, the keynote address of the seminar was delivered by the veteran scholar Dr. K.T. Pandurangi. The first section of his address has

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also been included in this opening part. Dr. Pandurangi noted the Indian tradition of the study of language as a vehicle of knowledge. Knowledge, he said, is described and stored in the human mind, and then transferred to language, which in turn transmits to the other mind. The first computer is the human mind and the second computer is language, he observed. Knowledge representation is mechanised so as to minimise the human effort in transmitting knowledge and to make it impersonal and autonomous, he added.

At the inaugural session just mentioned the formal welcome was accorded by Prof. M A Lakshmithathachar, Director of the Academy. Later Dr. R. Raja Ramanna, the eminent nuclear scientist spoke of the possible contributions of Sanskrit literature to today's needs. (An excerpt from Dr. Raja Ramanna's address is given in the Conclusions section). The session included two more addresses, one by Dr. D.K. Subramanyam, Professor at the Indian Institute of Science and another by Dr. M. Vidyasagar, Director of the Centre for Artificial Intelligence and Robotics, on the utility of and expectations from the seminar. These are however lost for want of transcription.

The second part of this volume deals with the modern subject-field of computational linguistics. In his paper "Natural language processing - Some issues", Dr. S. H. Srinivasan traces some of the syntactic and semantic issues that are generally considered in a Natural Language Processing system design. He then mentions some of the techniques devised to handle these - phrase structure grammars, frames, predicate calculus, and emergent representations.

In his paper, "Semantics in parsing", V Sridhar gives an account of the variety of techniques used to incorporate semantic knowledge in parsing. The methods described are: feature-driven transformational grammar, case grammar, class hierarchies, and tagged production system formalisms. He also mentions that the latter is suitable for Indian languages which have the free clause-order property.

To add interest to the two presentations on computational linguistics by these young researchers of the Indian Institute of Science, we have, going only once beyond the seminar proceedings, included a popular article, recently

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published in India (SPAN September 1993) which gives a broad-sweep review of some of the advanced concepts prevailing in this subject. Describing some sentence-parsing programs developed at the Massachusetts Institute of Technology, USA, it discusses the views of the celebrated Prof. Naom Chomsky and other scholars. The glimpses of linguistic thought caught in this article have counterparts in some of the articles in the section on Sanskrit linguistics.

Sanskrit Linguistics

The third part consists of papers whose main aim is to review ideas drawn from the store-house of Sanskrit linguistics. The eight papers in this part look at ideas in Sanskrit texts which have computational significance. The part opens with an extract from Prof. Pandurangi's keynote address which touches upon one of the general concepts in Sanskrit viz. the *apauryṣeya* language. Dr. Pandurangi noted that the concept which was put forward by the mimamsakas asserts that the word-meaning relation is eternal and not conventional. While it may make language more mechanistic, it would also make it autonomous, and therefore, a useful philosophical foundation of NLP.

In his talk "Excellence of the Sanskrit language" Panditaratnam K. S. Varadacharya takes us to the time of creation. He makes the point that the creation of forms (entities) and their names is simultaneous. The "natural" names constitute the Sanskrit language. A very useful notion of *rûpavyâkaraṇa* or grammar of forms emerges from the talk. He gives a lucid exposition of the concept, implying that knowledge representation can be subsumed in word formation. Incidentally the learned Vidvan makes the point that Sanskrit was not a mere refined version of a folk language but was itself a long-lasting well-evolved language even before it was codified by Pâṇini.

Dealing with the potentiality of words to convey meaning, Prof. M.A. Lakshmithathacharya said that the school of *Viśiṣṭâdvaita* has accepted a theory called *aparyavasânavrtti* according to which the words represent an object in their entirety. For instance, the word "mango" not only refers to the attributes such as colour, taste, smell etc. of the fruit, but also to their repository. Thus every word ultimately represents the concept of a whole (i.e. thing as well as all its attributes)

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stored in the mind by the experience of the object. Hence the word Gopal or John not only refers to the complexion, appearance and character etc., of that human being but also to his body, and beyond that to his soul and inner soul. (Unfortunately the recording of his talk was missed out)

Dr. N.S. Ramanujatatacharya's paper "The main substantive in verbal knowledge" is an authoritative exposition of three schools of *śâbdabodha*. The prevalence of these differinng schools finds repeated mention throughout this volume. Vidvan Ramanujatatacharya incidentally calls attention to a little-known fourth view of *śâbdabodha*, put forward by Sri Nigamanta Mahadeśika.

Vidvan N. Ranganatha Sharma's paper deals with another aspect, the purport of Sanskrit sentences embedded with *Nipâtas*. In Sanskrit there are certain words, the derivations of which cannot be explained by means of any rules. Such words are designated as *nipâtas* by Pâṇini. The *nipâtas* are also considered to be indeclinables, i.e. they have no declensions like other nouns; they have only one form. *nipâtas*, when used in a sentence, influence the purport of that sentence to a very great extent, though their meanings do not have any direct relationship with the meanings of other words in that sentence as shown in the illustrations. However, this treasure-house of knowledge could not be made available to the English-knowing readers of this volume due to the difficulty in translating the technical language of the paper into English.

Dr. K.V. Ramakrishnamacharyulu gives a detailed exposition of the *Kâraka* theory and discusses its application to language analysis, especially of Indian languages. He explains the Paninian injunctions for *vibhakti* assignment and provides a lucid explanation of the functioning of *kârakas*, and their nature, and *vivakṣâ*. The speakers' and writers' emphasis comes in through them. The identity given to individual words as noun, verb etc., he says, are really a sort of grouping of relations in which the given word can be involved. He points out that a precise way of ascribing intra-sentence relations to words, at the stage of generating a sentence, would be to assign *kâraka* codes to words on the basis of the sabdabodha version of the sentence. Remarking on the insufficient development of the grammars of Indian languages, he urges reconstituting of these grammars on the lines of Pâṇini.

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"Principles of *mîmâmsa* for NLP" by Vedavaridhi P. Ramanujan gives a detailed account of the *mîmâmsasûtras* of Jaimini along with a brief description of their backdrop. As mentioned before, this text deals with correct interpretation of Vedic texts. Hence it should be possible to derive from them some general principles of discourse interpretation. Ramanujan takes a step in this direction and lists some maxims (called *nyâyas* - not to be confused with the *nyâya* system). He has chosen a sample of *nyâyas* and presented abstractions of the discussions therein from which language-independent insights emerge. Also given are some maxims applicable in classical language domains called *laukikanyâyas*. He concludes with a brief but lucid exposition of the *mîmâmsakas'* views on how the import of a sentence is generated and suggests that a combination of the two processes viz. incremental cognition and final integrated confirmation would be the practical course.

It was mentioned that according to the *apauruṣeya* conception of language, the word-meaning relations are natural and not conventional. But words do change their meanings in the course of time. "Development of semantics in Ancient India" by Sri A. Bharadwaj delineates this process of change for some Sanskrit words in a systematic fashion with copious examples. There is also a reference to two popular Sanskrit lexicons - Yâska's (4th century BC) and Amarasimha's (4th century AD).

"Difference between *anvitâbhidhânavâda* and *abhihitânvayavâda*" by Vidvan D. Prahladachar presents some of the ideas from the scholarly debates on the topic. The author concludes in favor of *anvitâbhidhâna*.

In his paper "Relation of the Meanings of Words", Vidvan S. Umakanta Bhatta expounds, with examples the argument that the meaning of a word should not be construed with a part of the meaning of another word keeping identity as their relation but it may be construed like that if the relation is other than identity.

Towards Synthesis

The next part of three papers, grouped under the head "Towards Synthesis", explain some applications made in the field of computation and to

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some of the linguistic devices found in the Sanskrit literature. The first paper "An object-based knowledge representation and database definition methodology for Indian languages" by Dr. C. S. R. Prabhu takes advantage of the syntactic similarity of Indian languages. Most of the Indian languages follow a root+suffix style of syntax where the suffixes flag the syntactic roles. Also the root words are essentially the same for most of the languages. We can take advantage of these facts to develop a language processor which does root-suffix analysis and use an internal representation which is language-independent. This is the main theme of the above paper which also proposes an object-oriented representation of the knowledge base.

The paper by Dr. Saroja Bhate is about an aspect of Panini's work. As already mentioned, Pânini uses a number of devices to achieve ultimate brevity - one of which is the technique of using encodings. For example, a subset of the alphabet can be referred through a short code. The coding system is known as *samjñâ*. The paper "Computer understanding of Panini's *samjñâs*" exposes the structure of *samjñâ sûtras*, gives an in-depth description of the rules behind them, and concludes with some hints on the computer processing of Panini's work.

The paper "Pronominal reference and inferential mechanism in micro-structural representation" by Dr. K C Dash moves from Paninian linguistics to the *Nyâya* system. Micro-structural representation refers to an internal representation in which relations between entities in a discourse are made clear. To arrive at the correct relations, some kind of inferencing is required. Dr. Dash, in this paper, notes that the abductive inference of AI corresponds to the sesavat, one of the three kinds of inference of the *Nyâya* system. A significant feature of the paper is Dr. Dash's use of algebraic terminology to explain the concepts of Sanskrit linguists, for comparison with others.

Conclusions

Dr. Raja Ramanna's observations at the commencement of the seminar implied the anticipation that a thorough understanding of Sanskrit linguistics may help us to solve problems of linguistic communication which are steadily becoming more serious in physics. The ability of Sanskrit to handle very complex ideas, concepts and situations could be harnessed for this purpose, he implied.

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Dr. Pandurangi in the concluding section of his keynote address suggested that major semantic concepts in Sanskrit language should be studied and classified, and further that different layers of language such as ordinary, poetic, shastraic and so on have to be distinguished for separate processing. He listed the various views prevalent in the literature and proposed that various theories of Sanskrit linguistics should be thoroughly studied and "demarcated for the purpose of computation". In concrete terms he suggested that two/three-week summer and winter courses be organised involving Sanskritists, linguists and computer scientists as also a diploma course in Sanskrit and computer.

As one of the pioneers of the movement to apply Sanskrit linguistics to computational linguistics Prof. H.N. Mahabala looked back on the past efforts, and observed that research results cannot be achieved with a pre-set program for which researchers are recruited. Loosely structured interactions, such as this seminar will be more productive, he said. Also useful, though time-consuming, are computer science courses with a Sanskrit scholar as adjunct faculty, and they can spark off research ideas in minds "in the right state", he added. A further suggestion he made was for the study of the rules of deduction developed by Sanskrit scholars of yore, so that they may be extracted for the benefit of the computer science community.

The Panel Discussion produced many fruitful ideas for pursuit by linguists of both schools.

Dr. Prabhu restated the benefit of the object-oriented database system delineated by him, and urged that the research effort to take it forward should be well coordinated. The introduction of ideas drawn from the Nyaya and Navya Nyaya schools in that system can result in a very powerful database model, he felt.

Dr. T.V. Anantha Padmanabha argued for psycho-linguistic experiments to test out our theories, so that we may assess whether the theories are in consonance with cognition in the brain or are just explanatory models.

These observations were followed by a long intervention by Dr. R. Narasimhan, who chaired the discussion. At the outset Dr. Narasimhan recalled

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that years ago the main problem was to "build bridges" between computer scientists and traditional Sanskrit people. He said that listening to the seminar one learns that among participants and others, there are many bridge-builders. He suggested that one of their first tasks would be to write re-interpretations of Sanskrit texts in contemporary language. This material should cover Paninian linguistic tradition as well as *Navya nyâya* tradition. Curriculum and course material should be developed, he said, to make computer science graduates literate in Paninian and *Navya nyâya* ideas, under a comprehensive programme with a 5-year time-frame.

If some one can describe *Navya nyâya* in terms of first order predicate calculus, or if FOPC can be used to explain in what way *Navya nyâya* gives additional support for logical inference-making and the like, that would be most helpful to computer scientists. Another task for the bridge-builders is to understand, through dialogues with scholars, the traditional framework comprehensively, and fill the gaps. That would give more comprehensiveness to their interpretive material.

Dr. Narasimhan called attention to the ability of the computer to help the validation of a theoretical framework by demanding completeness and comprehensiveness. In respect of Sanskrit-based concepts applied to task-oriented computer programs, such validation is all the more important. The initiative and inputs for this must come from Sanskrit scholars who will be able to re-interpret tradition, Dr. Narasimhan observed.

Advising the Sanskrit linguistic community not to be awe-struck by the computer's successes in the application area, Dr. Narasimhan said that computer scientists are not nearing, but are yet searching for, ways to capture knowledge comprehensively for knowledge-engineering. He suggested moving laterally, away from the textual mode to other operational modes, for structuring world knowledge. One such alternative could be to resort to the Indian tradition, but to create confidence for so doing we have to demonstrate that that framework can be employed more successfully in task-oriented worlds than propositional knowledge bases. Dr. Narasimhan urged computer science people to move in this direction.

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Prof. D.K. Subramaniam wholly endorsed Dr. Narasimhan's suggestions. Supporting them further he drew on the example of Vedic mathematics, on which Prof. T.S. Bhanumurthy od Madras acted as the bridge-builder between western mathematicians and traditional scholars. He made some suggestions for interaction between Sanskrit scholars and the computer scientists at the scholar-expert level. For example, Sanskrit students could spend some time in institutions at doctoral or post doctoral level; many institutions have openings for such visitors. Likewise, computer science students could do graduate projects on ways of bridging Sanskrit and current formalisms; and so on.

Dr. Saroja Bhate suggested that future seminars should have their agendas more clearly focussed. Observing that workshops are more fruitful than seminars, she said that in such gatherings Sanskritists should write down something specific for the use of computer scientists, say in notational formation, and likewise others should also make concrete contributions. Further she suggested that a complete bibliography of publications and articles in this subject- field must be prepared and a database should be created for all computer programs available in India as well as the world over in regard to Sanskrit linguistics. Finally, Dr. Bhate stressed the need for study groups and assignment of time-bound projects in areas identified for further research.

A word of Acknowledgement

Many persons have offered their indispensable help both during the seminar and for the preparation of this volume. The staff of the Academy, under the self-effacing captaincy of its Director, Prof. M.A. Lakshmithathathachar, stretched to their limits to make the seminar memorable. Dr. S.H. Srinivasan painstakingly, as well as thoughtfully, arranged the papers and set the base for this overview. Dr. H. V. Nagaraja Rao amazed everyone with his impeccable on-line translation of the Sanskrit talks. He was also generous with his help on the translations published in this volume.

Written as Editorial Note by S.H. Srinivasan;
expanded and edited by M.A.S. Rajan

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ABOUT THE SEMINAR

M. A. S. Rajan

In a broad sense this seminar is the manifestation of the great interest that the Government of India has, in promoting the technical development of Indian languages, and in particular its abiding interest in the development of Sanskrit. As you are aware, the Central Government's interest in these directions is enormous, and has given rise to a number of projects in different parts of the country, attending to different aspects of linguistics and semantics. While they are being pursued and studied, the tasks of consolidation, focussing, networking and channeling of effort for the future, seem to have become necessary. This will be one of the under-currents in the seminar.

The Central Government has also taken up many thrust areas in the field of computer science and technology. National centres and national initiative organisations have been set up and are doing yeomen service. Particularly noteworthy are institutions like National Centre for Softwate Technology (NCST), Centre for Development of Advanced Computing (C-DAC), Foundation and Methodology of Theoretical Science in Indian Tradition (FAMTSIT) and National Institute of Science Technology and Development Studies (NISTADS). We are fortunate to have distinguished representatives from several of these centres at the seminar, to enrich its deliberations.

A significant feature of the seminar is its cross-cultural character. We are very gratified with the presence of many distinguished *pandits* and *vidvâns* with expert knowledge of Sanskrit texts bearing on the seminar topics. Several of them are multi-lingual, capable of discoursing in Sanskrit, English as well as an Indian language, and even helping us with summary translations from one language to another. With the joint presence of distinguished specialists from the

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field of computer science, the seminar will witness dialogues between two great intellectual resources. Two benefits, among others, will be anticipated from this *Manthanam*. A thrust towards more purposeful theoretical and fundamental research and some form of organisation for a joint group to co-ordinate and channel the all-India effort in this field. This will be another, and strong, undercurrent of the seminar.

Knowledge-representation is a major area of discussion during the seminar. The concept of knowledge or cognition and its intimate relationship to linguistics and theories of inference, have been extensively covered in classic Sanskrit literature. In what ways and with what focus should these texts be accessed, in order to provide relevant and helpful guidance to computational scientists for knowledge representation ? This is an area of thought which we hope will be found absorbing.

Computer scientists with information on the state-of-the-art in this area can make a very significant contribution to the discussion, on the basis of inputs from the Sanskrit vidvâns present. Here the prime need is for a precise articulation of what they need. Problems of communication enter here. Idioms, terminology and analogies differ in the two systems. Via media have to be found. This is a challenge posed by the seminar. One could say it is a linguistic challenge in the interfacial area between Sanskrit and English.

To continue this very brief account of the seminar's objectives, I would recall some lines from a back-grounder that we sent to the participants. In the discipline of linguistics, enormous research has been devoted, the world over, to the evolution of grammar formalisms for particular natural languages. In the field of semantics, enormous work has been done to formulate systems for extracting meaning from sentences and passages. The topics of computational linguistics and knowledge-representation for computers, have reached an advanced stage of sophistication because of the vast amount of work done to develop systematic formalisms and to device procedures for their application.

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More recently the Indian system of grammar as well as the Indian semantic and logic systems, based on classical Sanskrit literature, have also been studied. Pâniniyan and *Nyâya* models of structural representation have been found to be acceptable for use, for example, in natural language processing. Although much work has been done, there is still great paucity of data, in forms suitable for computational linguistics.

One of the aims of the seminar is to understand the state-of-the-art in respect of all these systems. Utilising the presence of experts in the classical Sanskrit systems, an effort will be made to understand theories put forward in Sanskrit literature with regard to semantics, logic and inference in the terminology of the world-wide effort. The aim here would be to describe the alternative systems and juxtapose their ideas and theories and thereafter to see what further theoretical efforts are relevant and useful for this country to pursue.

I say juxtaposition since, at this stage this is as much as we can attempt. The reason is that at a fundamental level we can see a basic difference between the Indian approach to the science of language and to systems of inference, as compared with those used in computer science. Classical Sanskrit literature abounds with linguistic formulations, systems of semantic analysis and systems of logical inference. This literature however is a product of the continuous effort, sustained over a long period, to discover the correct or true meaning of the sacred texts. The prime objective of the effort was exegesis of the words and passages found in the most revered scriptural works. Often this was no more than a polemical exercise, to show how those texts aided and supported one's own understanding. The scholar-perceptors did not avoid the disorderly, rich and vigorous world of language users. They confronted the words and passages handed down through the ages and strove to interpret them to people who were using words and passages in their own way. In so doing, they identified the logical structure behind usages common to both streams and codified them. For it is an accepted tenet of scriptural exegesis that the rules of everyday linguistic

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usage must be presumed to apply to scripture too. This has also been adopted in the Pâniniyan system. The saying in this respect goes thus: **य एव लौकिकाः त एव वैदिकाः, य एव वैदिकाः त एव लौकिकाः** (*ya eva laukikâḥ ta eva vaidikâḥ, ya eva vaidikâḥ ta eva laukikâḥ*). Words in wordly usage are no different from words in Vedic usage, and vice versa.

On the other hand in computer science, theoreticians seem to have striven to identify or even devise, tools and processes with the aid of which languages can be synthetically assembled to be fitted into the environment of computation. The approach is typically scientific, in the sense that science strives to bring order into human experience. The computational scientists accordingly strive to make the disorderly, rich and vigorous word of natural languages into something which is precise, convenient and universally adaptable. The object of the effort of course is to go further and make available computers which can utilise the tools and procedures so developed, to produce ever more intelligent and helpful computers.

Because of a difference in the time-periods of their respective emergence one more difference can be observed. In computer science the language structure and semantics used are a recent creation, brand new. In the Indian classical texts, language structures and semantics are old, lying buried and although fully analysed and described in vast detail, they have to be polished before use.

The basic difference would doubtless be observed in the seminar discussions but the effort will be to see how the two can complement each other and can enhance each other's proficiency. What further work should we chart out for ourselves for this purpose ? This would be an apt issue to be considered in the seminar.

Theories and broad concepts are often looked upon as luxury. The demand is for practical applications. Quite understandably, this demand has come to the forefront these days in our country. The seminar will have

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several presentations which are application-oriented. The insights gathered by these experiences are of great value. The seminar will no doubt come up with suggestions for focussing these efforts in particular directions, such as educational software, machine translation and the like. What the seminar would be additionally looking for in this area, is some indication of the lines of basic research activity which will promote the application-oriented excercises. For example, it is already clear that extracting rules from descriptive and dialectical texts is a major requirement. Indeed such extraction would be more akin to distillation than mere separation. This needs research. The effort would be massive and it would need quality control and expert monitoring. Other examples of systematic research can also be visualised.

Application-oriented work, attuned to the wish-lists of the national and international marketplace, has strong motivation behind it. Likewise a great deal of scholarship and research is being devoted to studies which respond to the pull from overseas sources, for capsuled data about cognition, knowledge structures and inference systems drawn from the Indian tradition. This is also a strong motivation. But one has to ask the question, are these motivations sufficient to cause enthusiasm or excitement among profound traditional Sanskrit scholars ? Would it not be necessary to think of computer applications or knowledge engineering works which are more akin to the Sanskrit classical tradition ? That is, should we not also look at applications in the areas of philosophical and scriptural exegesis ? Treat this, if you will, as a concession to the classical Sanskrit world. But it would be a potent way of drawing out, even in other directions, the vast intellectual resources residing in the Sanskrit world. The challenge in this seminar would be to contemplate, if not arrive at, ways of meeting this difficult requirement.

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KEY-NOTE ADDRESS

(Extract - Section I)

K. T. Pandurangi

India has a great and continuous tradition of the study of language as a vehicle of knowledge. Dandin a writer in poetics declares that if the light of language were not there, the whole world would have been in the darkness of ignorance.

इदमन्धन्तमः कृत्स्नं जायेत भुवनत्रयम् ।
यदि शब्दाह्वयं ज्योतिरासंसारान्नदीप्यते ॥ (काव्यादर्शः I-4)

(*Idamandhantamaḥ krtsnam jâyeta bhuvanatrayam* ।
Yadi śabdâhvayam jyotirâsamsârânnadîpyate ॥ - *kâvyâdarśa* I-4)

Bhartṛhari states that all knowledge is represented through the language only.

न सोऽस्ति प्रत्ययो लोके यः शब्दानुगमादृते ।
अनुविद्धमिव ज्ञानं सर्वं शब्देन भासते ॥ (वाक्यपदीयम्)

(*Na so'sti pratyayo loke yah śabdânugamâdrte* ।
Anuviddhamiva jñânam sarvam śabdena bhâsate ॥ - *vâkyapadîya*)

He also states that the language plays the double role of representing the knowledge and communicating it.

ग्राह्यत्वं ग्राहकत्वं च द्वेशक्ती तेजसो यथा ।
तथैव सर्वशब्दानामेते पृथगवस्थिते ॥ (वाक्यपदीयम् I-55)

(*Grâhyatvam grâhakatvam ca dveśaktî tejaso yathâ* ।
Tathaiva sarvaśabdânâmete prthagavasthite ॥ - *vâkyapadîya I-55*)

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Knowledge is both generated and stored in human mind. But to communicate it from one mind to another the language is the vehicle. The knowledge accumulated in the human mind is transmitted to the language, and then, it is communicated to the other minds. To assist this process and to make the language an effective vehicle, the science of linguistics is developed.

Though the expression 'linguistics' is a recent one, the various disciplines of linguistics have been developed since long. In India Phonetics, Morphology, Syntax and Semantics - the four important branches of linguistics were developed under the heads *Śikṣâ, Nirukta, Vyâkaraṇa* and *Vâkyasâstra*. These served to make the language a very authentic vehicle of knowledge. In the course of the long history of the development of human thought, the knowledge has grown to such an extent that we have to find out a way by which it is preserved in a compact form and made available, eliminating human agency and human intervention as much as possible. For this purpose our scientists have developed computer technology.

The computation methodology and computer technology now developed is the third stage in the preservation and communication of knowledge in the human history. The human mind is the first computer, because, it computes the knowledge gained by the man systematically, stores it, and provides it to him for his activities. It gives him a continuity of psychic personality and a direction for his activity. The *Nyâya* system rightly defines *Âtmâ* as *jñânadhikaranam Âtmâ* (ज्ञानाधिकरणम् आत्मा) and *Jñâna* as *sarvavyavahâra hetuh buddhih jñânam*. (सर्वव्यवहारहेतुः बुद्धिः ज्ञानम्). Therefore as a store house of knowledge computed in it, and as one that makes use of that knowledge for man's functioning, human mind itself is a Computer.

The Second Computer is the language. The language involves three parties i.e., the speaker, the listener and the matter spoken. The speaker transmits his knowledge through the language, the listener obtains it through the language and the knowledge of the matter is represented in the language

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and made available to the listeners. Thus the task of organised presentation of knowledge is done by the language.

Now, we are moving a step ahead. The knowledge representation through the language is required to be mechanised so as to minimise the human effort in trasmitting the knowledge and also make the presentation of the knowledge compact and universal. In other words to make the knowledge representation impersonal and autonomous.

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NATURAL LANGUAGE PROCESSING - SOME ISSUES

S. H. Srinivasan

Abstract

This paper reviews some of the representational issues in and schemes for natural language processing (NLP). In the first part of the paper we show that NLP is a knowledge-intensive task. Using several examples, we highlight the different types of knowledge that are needed for NLP. The subsequent sections briefly consider some representational schemes proposed - frames and scripts, formal logical approaches, and interactive models. The paper closes with a discussion on the meaningfulness of the computational approach to language.

The structure of every sentence is a lesson in logic.

— John Stuart Mill

What does it take to use a natural language? Ask any speaker and the answer is likely to be : words of the language and the grammar of the language. After all, these are what are taught in language classes. The words of the language can be found in any good dictionary. Grammar appears to be more tricky but nevertheless seems amenable to description. Why is one of the following two sentences ungrammatical ?

That Mary saw *John* is obvious.
*Who is that Mary saw obvious ?

In addition to accounting for the unacceptability of the above sentence, the grammatical description used should be capable of capturing similar cases also. To arrive at the correct structure of grammatical sentences, it turns out

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that we need knowledge not only about words and grammar but also about objects, actions and events in the world. Consider the sentences.

John opened the door with his key.

John opened the door with his boss.

Despite the apparent syntactic similarity of the sentences, the roles of the entities *key* and *boss* in them are entirely different. Something other than the grammatical knowledge is required. In this example, the knowledge that doors cannot be opened with persons as instruments is required. In the above case, knowledge about the verb seems sufficient. But in some cases, other types of knowledge are required.

John saw Mary in the park with a telescope.

In this sentence the default attachment of *telescope* should be to the park. Depending on the actual discourse, the attachment may be to *John* or *Mary*. Thus knowledge about defaults in the world is required in many cases. We also need knowledge to interpret the text in a cohesive fashion. In the sentences,

John couldn't start the car; he'd forgotten the keys.

John tried starting the car; the vehicle wouldn't move.

We should be able to relate the *key* to the keys of the *car* and the *vehicle* to the car mentioned previously. Hence in addition to the question

- What are the different types of linguistic phenomena ?

we also ask the following questions :

- What knowledge must a person have to speak and understand language ?

- How can this knowledge be organized for effective use ?

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As mentioned before, one of the obvious linguistic phenomena is that of *grammaticality*. The notion of syntax seems to be a fairly robust phenomenon worthy of study in its own right independent of meaning constraints. The sentence

Colorless green ideas sleep furiously.

Though nonsensical, is considered grammatical. Syntax is generally a sentence-level phenomenon, as spelling being a word-level phenomenon.

Some other linguistic phenomena which have been identified are :

anaphora : This is usually a compact reference to some of the entities mentioned previously as in

Give the bananas to the monkeys although *they* are not
ripe because *they* are very hungry.

In some cases, the referent comes after the anaphoric reference as in :

Because *he* happened to be near the restaurant,
John wanted to have an ice-crem.

ellipsis : Gaps in the sentence which are to be filled using previously mentioned words. The words can be verbs or nouns, among other things.

Have another chocolate. - No thanks, that was my third (chocolate).
I'd better see him. I don't really want to (see him).

modals : These express possibilities, necessities, obligations etc. rather than actualities.

People living in glass houses may not throw stones.

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counterfactuals : These are contrary to factual expressions.

If I *went* tomorrow, what would you do ?

In most of the cases, there are some lexical and / or syntactic clues to the presence of these phenomena. The major thrust in linguistic research is to identify the constraints that apply to these phenomena. For example, from the sentences.

*John saw him.
*John saw a picture of him.
John, claimed that the picture of him
hanging at the post office was a fraud.

We explain the awkwardness / unacceptability in two of the above sentences by postulating the constraint that a non-reflexive pronoun and its antecedent may not occur in the same simple sentence. In addition to capturing such constraints, a natural language processing system should have means for efficient *representation* of such constraints - a topic we discuss later.

In addition to representing linguistic knowledge and knowledge about the world, we also need to represent knowledge about knowledge, beliefs and attitudes of people. For example consider the following passage.

> Three days ago, on a Saturday, John decided he wanted some cereal for breakfast. However he had to go to the supermarket, where, after finding the shelf where the milk was, he paid for it and left. When he got home, he found that the milk was sour. "Well, no", he thought.

What knowledge is required to answer the following questions ?

Why did John go to the supermarket ?

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What did he pay for ?

Did John have cereal for breakfast ?

What was he complaining about ?

To answer these questions, we need information about the normal and abnormal course of events, likes and dislikes of people, etc.

1 Representation Issues

Having considered the need for knowledge, we now address the issue of its representation. The difference between knowledge and its representation is brought forth in a dramatic fashion in the following example.

> **The mutilated checkerboard problem :** Consider a normal checkerboard from which two squares, in opposite corners, have been removed. The task is to cover all the remaining squares exactly with dominoes, each of which covers two squares. No overlapping, either of dominoes on top of each other or of dominoes over the boundary of the mutilated board are a lowed. Can this be done ?

One way to solve the problem is to try all possible coverings and get the solution. Another way is to color the squares with black and white as in a chessboard. In this there will be 30 black squares and 32 white squares. Since a domino covers one black and one white square, non-overlapping dominoes can cover an equal number of black and white squares only. Since in the case of mutilated checkerboard problem their numbers are different, covering is impossible. Thus representations are a crucial factor in deciding between acceptable and unacceptable solutions. We now discuss some of the representation schemes used in NLP.

1.1 Syntactic representation

One dominant approach to representing syntactic information is the *parse tree* which makes the structure of the sentence explicit. The orgin of parse trees is in the Transformational Generative (TG) Grammar by Chomsky

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in 1957. TG gave a fresh impetus to the study of syntax. In TG framework, grammar is viewed as a device for generating all and only the grammatical sentences of a language.[1] Thus the TG formalism took the thrust away from descriptive or parsing approaches to grammar. The grammar is considered as a set of *phrase structure* rules of the following form :

S → NP VP
NP → Det NP1 | pro | Np1 | Proper Noun
VP → Verb NP
NP1 → ADJS Noun
Noun → cat | dog
Pro → she | he
Det → the | a
Proper Noun → John | Mary
Adjs → Adj Adjs
Adj → small | big
Verb → have | is

The above grammar can be used to generate sentences like

Mary is a small cat. John is a small big dog.

(For an example of a parse tree, see figure 1.) Sentences generated using the phrase structure rules have a tree structure - called the *deep structure*. There are also a set of *transformational rules* for transforming the deep structure to the *surface structure* which is the actual utterance. The distinction between deep and surface structures was motivated by the observation that :

• different sentences can correspond to the same statement. For example, the active and passive forms of a statement appear different.

[1] One of the motivations for the generative framework is that the parsing / membership problem for a recursively enumerable language is undecidable.

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• similar sentences may not be treated in the same way. For example,

John is easy to please.
John is eager to please.

are different in that they may not be paraphrased in the same way.

To please John is easy.
*To please John is eager.

Pure TG gradually fell out of the favor of NLP researchers because of a number of reasons. The commitment of TG was to the description of grammar (*competence*) and not to the way it is used (*performance*). AI researchers were interested in performative systems and building of such systems required some extragrammatical knowledge to even parse sentences. We have seen examples of this before. The integration of semantics and world knowledge to TG could not be done seamlessly (at least with the methodological commitments of TG). Hence various augmentations of TG are used in NLP systems - some of the enhancements violating the commitments of TG.

1.2 Semantic representations

During the incipient stages of NLP research various schemes were proposed for representing semantic information about objects and actions including case grammar, semantic nets, etc. All these issues are now integrated under the notions *frames, defaults,* and *inheritance.*[2] A frame is basically a collection of (attribute, value) pairs. As an example of a frame hierarchy, consider one shown in figure 2 for buildings. In this, we consider various types of buildings : residential, office, shopping, etc. The basic features of a building, like number of floors, parking, etc are kept in the building frame. Some of the attributes have defaults associated with them. The supermarket frame has some associated features like elevator, shelf, etc. If we want to know

[2] The object-oriented style of programing has become popular with AI workers for the implementation of frames.

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whether we can expect a supermarket to have parking facility, we travel up the hierarchy and come up with an answer "yes" after looking at the shopping frame. Frames are usually used to represent knowledge about objects and actions.

Dealing with stereotyped sequences of actions or events requires another type of representation structure called *scripts*. For example, to answer questions about the breakfast passage (in page 2), we need information about the normal and abnormal course of events about breakfasts and supermarkets. The following, for example, are the expected sequence of events in a supermarket scenario : parking, entry, locating, paying, exit. The supermarket script contains this sequence. If one is not able to enter the supermarket for some reason - the day being a closed day for the supermarket - other events in the script are not traced. Also events like parking have their own scripts. In general scripts have *entry conditions* - conditions which invoke the script, *tracks* - alternative sequences of events, results - conditions which can be assumed to hold after normal termination of the script, etc. After selecting an appropriate script, we fill in the events described in the actual text and use the other events contained in the script completing the gaps.

1.3 Sociology of AI

The foregoing account was not to meant give the impression that the structure of AI is monolithic - there are a single set of goals, methodologies, techniques, etc. The aim of the discussion was to furnish a backdrop against which competing viewpoints can be discussed. The previous knowledge representation schemes belong to the "experimentalist" school of AI which believes the goal of AI is just a working computer program not the theory behind it. The formalist school views the computer as a tool in the implemention of various formal methods of representation and reasoning. Also there is difference in perception between the researchers about the nature of the program / theory. Those who profess *strong AI* claim that computers can be made to actually think, just like human beings do. More precisely, they claim that there exists a class of computer programs / theories, such that any implementation of such a program / theory is really thinking. Those of the

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weak AI claim that computers are important tools in the modeling and simulation of human activity. Having mentioned some alternative viewpoints, we discuss them briefly. We first address the formal or "rationalist" studies in representation and reasoning followed by the "emergent AI" approaches.

2 Formal approaches to representation

The main manifesto of the formalist approach is "If you take care of syntax, the semantics takes care of itself." In other words, we design the syntax of the language (representation) in such a way that the conclusions arrived at using purely syntactic operations correspond to what we consider semantically acceptable. An epitome of such a formal approach to representation and reasoning is the First-Order Predicate Calculus (FOPC). FOPC was originally developed to capture and explore the nature of mathematical reasoning. Since mathematics deals with absolute certainties, FOPC was developed to handle only the truth values True and false :

As an example of the application of FOPC to natural language semantics consider the following sentences :

Socrates is a man.

All human beings are mortal.

Using the inference rules of FOPC and the fact that All men are human, it is possible to arrive at the conclusion.

Socrates is mortal.

on a purely syntactic basis using FOPC. But FOPC is inadequate to capture the following types of situations. There are some formal logics for handling each of them.

modality : statements can be necessarily true, possibly true, etc.

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epistemic : reasoning about the knowledge and beliefs of agents. For example, if "John saw Mary" and if Mary happened to be CS student, we can say that "John saw a CS student". But if "John believed that he saw Mary", then we cannnot have "John believed that he saw a CS student".

nonmonotonic and temportal : handling additions to the base set of beliefs in a formal way. In FOPC, the base set of axioms is fixed and any new added axiom should be independent of the base set. But in real world, an agent should make decisions based on incomplete information which are likely to be revised in light of new evidence. The higher-order logics are tailored to handle such situations.

fuzzy : handling fuzzy notions like "tall", "acceptable", etc.

Hence the quest in formal AI is for knowledge representation techniques which extend the FOPC to handle the above situations as well. The hope is that it will be possible to capture the facts about the world in purely syntactic way which machines can manipulate.

3 The subsymbolic paradigm

All of the above schemes try to formalize representation at the linguistic or conceptual level in the sense that the symbols, like *human, mortal,* etc., used in the above formalisms correspond to the common sense world or the "world of middle dimensions". And the underlying assumption is that the operation of the brain/knowledge about the world is formalizable at this level. But it is quite possible that formalization may not be possible at this level but at a lower level like enzymatic, cellular, molecular or quantum level. The *connectionist* or *subsymbolic* approach addresses this issue at a level higher than the cellular (neural) but lower than the symbolic level. The highlights of connectionist approaches are

1. a greater potential for interaction between various knowledge sources. For example, it is possible for a parsing decision to be based on prosodic, semantic and pragmatic constraints - in addition to lexical and syntactic constraints.

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2. robustness - the greater degree of interaction gives rise to a higher degree of fault tolerance in terms of information failure (i.e., partial information), hardware failure, etc.

3. learning - most of the connectionist models have a learning protocol associated with them using which the model extracts knowledge from examples.

Due the highly interactive nature of connectionist processing and the learning of new representations, the connectionist representations are also called "emergent". Connectionist models have not been used in language studies to great extent since it is difficult to represent constituent structure using connectionist net works. But there are some intriguing studies in which hierarchies emerge in the network representation after learning[3].

4 Philosophical Foundations

The formalist hope of formalizing the world using representation has drawn fire from the phenomenological school of philosophy. The phenomenological arguments are based on the following insights.

• Language is always interpreted in a tacitly unerstood background.

Hence in a formal language understanding system, the background is also to be formalized. It has been argued that any formalization or theory makes sense or can be interpreted only in some context. Hence the notion of formalizing the background is meaningless.

• This interpretation is not merly for its information content but because of its potential usefulness for further action.

For example the statement :

All persons are created equal

[3] In the studies by Elman, the hierarchical clustering of the hidden unit activations reflects the hierarchical information in the examples.

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cannot be judged as a true or false description of the world. Its force lies in the commitments it makes for further characterization and action. It is not clear how these insights apply to systems which have a potential for action e.g., robotic systems and systems that learn e.g. connectionist networks. Because such systems are capable of learning through interaction with the enviroment, they are potentially capable of handling any breakdown in their reasoning process. But present day connectionist systems are far from developing sophisticated representations which can potentially deal with breakdowns.

5 Conclusion

In this paper we considered various approaches-formal, semi-formal, and learned - to representing world knowledge in natural language systems. The semi-formal approaches have been extensively used in NLP systems. The formal representations-except FOPC-have not been used because of their high computational complexity. The connectionist models are used only for various "low level" tasks at the level of phonemes. We then reviewed some arguments on why the former approaches may not succeed in their ultimate goal of building strong AI systems. These arguments do not preclude the possibility of useful NL systems - like limited translation systems, interfaces, etc. The arguments do not also apply to systems that learn from experience. We believe that it may be worthwhile studying systems that learn to develop sophisticated representations. Since biological systems do develop flexible representations, looking for clues to learned representations in biology may also prove useful.

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TRANSFORMATIONAL GENERATIVE GRAMMAR

REPRESENTATION : Tree structure for depicting the deep structure of sentences. (eg) That John likes Mary is obvious.

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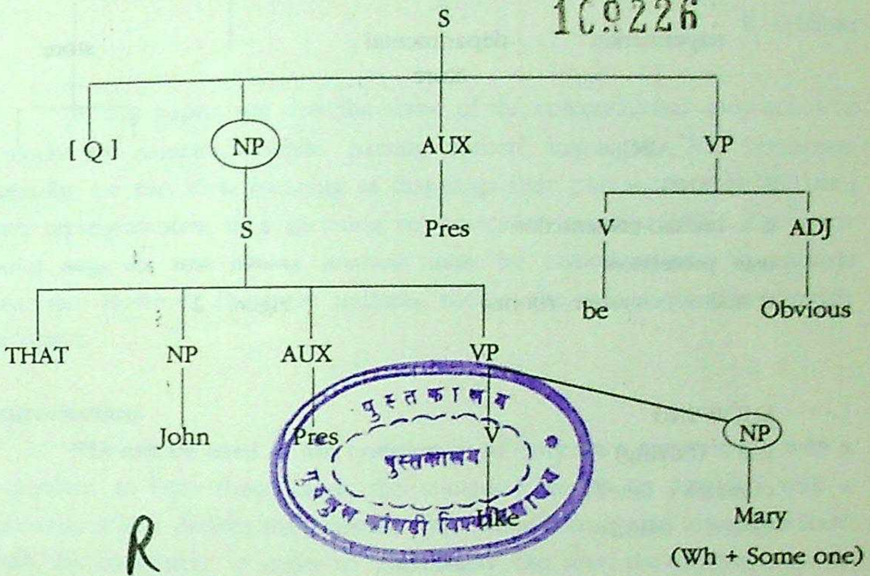

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Figure - 1

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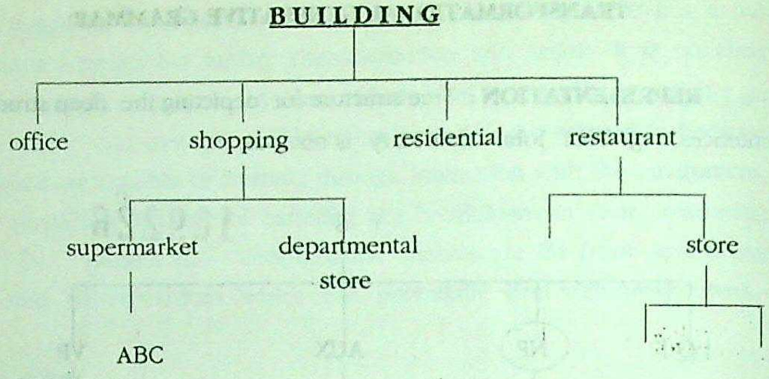

BUILDING
is a: human-construction
use: protection
contains: (entrance, rooms)

Figure - 2

|

SHOPPING
use : (buying)
contains : (shelf)
closed : (sunday)

|

SUPER MARKET
Parking : (yes)
contains : (elevator)
no. of floors : (3)

|

ABC
instance
no. of floors: 4

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SEMANTICS IN PARSING

V. Sridhar

In this paper, we describe some of the computational approaches to account for semantics while parsing natural languagee (NL) sentences. Broadly, we can view meaning as mappings from phrase-structure (PS) trees into representations in a meaning representation language (MRL). This view point suggests that syntax analysis must be carried out prior to semantic analysis. However, there are attempts, such as the task of defining semantic grammar.

Introduction

NLs can be used to ask question or to carry on a conversation with a computer. In both those cases, the computer has to be provided with a grammar which defines the possible ways the user is allowed to communicate with the computer. In order to "understand" the user, the computer has to analyze the user's sentences and utterances.

Noam Chomsky introduced formal models for the description of NLs. In order to overcome the shortcomings and to improve its applicability, various generalizations and modifications of context-free grammar have been introduced : transformational approach, augmented transition networks, definite clause grammars, feature-theoretic syntax.

Artificial intellingence (AI) approach to the study of language understanding uses, heavily, information about the field of discourse and general world knowledge and not just syntax of the language. In order to understand a sentence, it is necessary to consider linguistic and extralinguistic knowledge. However, people without the linguistic knowledge are able to

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understand and use language. The assumption is that human beings have a biologically determined language faculty. It is required to find out how this faculty works. When our task is to make computers understand NL, we have to make explicit all the knowledge employed by the human brain.

People understand sentences. Part of this understanding is obtained with the help of linguistic knowledge related to syntax and semantics of a language. Linguistic theory explains linguistic knowledge and also explains how we understand sentences. The knowledge includes the ability to make grammatical judgements syntactically and semantically viable phrases, ability to understand the roles played by subject and predicate, different roles played by nouns and verbs, relations that noun phrases and verb phrases can entertain with each other, use of the verbs. However when reading a text or a sentence, "complete" understanding requires extra linguistic knowledge, domain knowledge, commonsense knowledge, etc.

Summarizing, in addition to syntactic and semantic knowledge, the process requires the application of pragmatical and contextual knowledge. Due to these diverse types of knowledge, a human listener can "be ahead" of the speaker by making hypotheses about what the speaker is going to say next.

Computational approaches

Typical applications of NL analyses include : the development of NL understanding systems, NL front-end for export systems and databases, machine translation systems. Keeping the applications in mind, we can proceed with the assumption that the meaning of a noun phrase is the intended "referent" and the meaning of a verb is the intended "action". Based on the assumption, we can say that the meaning of a declarative sentence is the assertion of the associated fact, the meaning of an interrogative sentence is typically determining values for "answer" variables, and the meaning of an imperative sentence is the procedure associated with the intended action of the verb.

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Transformational approach accounts for meaning of a sentence by sub-categorization of the verbs based on contextual features. That is, based on features such as abstract, animate etc. which describe properties of subjects and objects of the sentences in which verbs appear. The lexicon entries for verbs need to be extended in order to allow the representation of these features. Verbs may have information such as whether transitive intransitive etc. Whether certain transformations can be applied etc. Additionally, it may be analyzed into a complex symbol i.e - a set of features: + count, + Animate, Human etc. Strict sub-categorization rules analyze the verb category into a complex symbol in terms of categorical context; some verbs may or may not take a direct object; some verbs may be followed by adjectives; some verbs may be followed by prepositional phrases; some verbs take that-clause; etc. The second type of sub-categorization rules are the selectional rules. It is assumed that selectional restrictions deal with semantic properties of a language. More specifically selectional rules are concerned with semantic properties using features such as Human, Animate, Concrete, Liquid, compartment, food, agricultural process. Meaning of a Sentence, in the transformational approach, is derived from its deep structure. Rules of interpretation can render the semantic interpretaion of each deep structure. Distinctions such as logical subject (deep structure subject) and grammatical subject (surface form subject) help make deep structures more amenable for semantic interpretation. Thus a possible rule of interpretation might say that in the deep structure, the logical subject is that NP which is immediately dominated by S and logical object is that NP which is immediately dominated by VP. On account of transformations, multiple surface forms get mapped onto a deep structure. Thus, deep structure is somewhat like a prototype and it is natural to associate meaning structure with it. Typically, we can associate logical forms with deep structures. Logical forms are one of the most widely used meaning representation structures and in this case, first-order logic and its variations form meaning representation languages. Building a NL processing system based on transformational approach requires the utilization of inter-se transformations. This is because the transformations typically transform a deep structure into a surface structure while NL processing systems begin with a surface sentence. In this case, we say that a sentence is valid if the inverse

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transformations can transform a surface form into a deep structure. We can employ certain heuristics to resolve conflicts while selecting a transformation to be applied. We will have to exhaust all possible ways the transformations can be applied before declaring it as invalid. This combinatorial problem can be handled by employing the prior knowledge regarding the nature of transformational rules and some heuristics regarding the order of applicability of these rules.

One approach that goes beyond the above notions is the case-based approach. It makes use of case-grammar notions such as AGENT, INSTRUMENT, OBJECT, EXPERIENCE, SOURCE, GOAL, etc. and are used to describe the meanings of sentences. In order to make correct association between cases and noun phrases in the sentence, it is necessary to employ semantic information which can be represented in the lexicon. As opposed to these "surface" cases, one can employ "deep" cases that deal with variations in the surface cases which do not affect meaning. Alterrnatively, "conceptual" cases enable a sentence to be interpreted in terms of a small number of concepts. A word in a sentence is analysed to separate it into a number of distinct components and its meaning is described using those components.

Semantics can also be defined from the point of view of databases: a word can name a relation, an attribute, a set, or a database value. The meanings of the defined words are constructed out of the above. For example we can say that two words are synonyms if they refer to the same value in database. Further, the generated logical form (denoting the meaning of the sentence) can be evaluated against the database. Depending on the results of evaluation, we can say whether the sentence is valid or not. Information present in the database can also be used to distinguish verb-modifiers. For example, a verb-modifier is a diret-object if it is the second logical object or the unique logical object of the sentence; relation corresponding to verb has direct-object attribute, and verb-modifier is associated with the correct domain for that attribute. Similarly, we can say that a verb modifier is benefactive if it is the first logical object (of the two) or the for-object with

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the above latter two conditions. These sophisticated categories can be called as cases. For many cases, to distinguish we need the domain type, such as person, item, money, etc. In this sort of approach, the lexicon entry includes the relation and the attribute associated with each case for the verb.

For processing Indian languages, we can employ production system formalism. In order to account for free-clause order property of Indian languages, we make use of modified production system called as tagged production system. For example, if the rule is that at the sentence level, all clauses except the verb clause can occur in any order, then we can annotate the rule using the tag - { } to indicate the same. Thus the parser can process these tags to account for subtleties of Indian languages. Semantics can be accounted by making use of the domain knowledge. The output of a parser which is in the form a set of clauses can be used to validate the sentence for its semantics. For example, we can represent the domain knowledge in the form of a class hierarchy. The various classes denote the different kinds of nouns that are encountered and as a result we can map the various clauses (except the verb clause) into the classes in the class-hierarchy. The qualifiers appear as attributes of the objects. Here the objects are nothing but the instances of the corresponding (corresponding to clauses in the sentence) classes. One important attribute of a class is the kind of actions that can be performed by the instance objects. The inheritance mechanism permits the attributes of super classes (that is ancestors) to be inherited by the sub-classes thus paving the way for economical representation of knowledge. Thus in this approach semantic analysis of a sentence results in an object network where the multiple objects are linked using an action-oriented verb clause. Semantic relevance can be determined by identifying the object aliases. Thus, we can say that a paragraph is semantically relevant if the corresponding analysis structure is a single connected object-network.

Conclusion

Semantics in parsing can be achieved either declaratively or procedurally. The main disadvantage of the procedural mechanism is that it appears adhoc in its approach. The declarative formalism, on the other hand, can account for semantics elegantly. Such approaches employ some sort of unification to carry out processing : term unification or graph unification.

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Thus, even though the question "what is meaning" has not been answered satisfactorily, there are wide-ranging attempts to answer the question computationally with the main objective of building practical NL systems.

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LANGUAGE BUSTERS

Beth Horning

Computer scientist Robert C. Berwick of the Artificial Intelligence Laboratory at the Massachusetts Institute of Technology (MIT) in Boston says the research he and his colleagues are doing represents a "real revolution". Perhaps the most ambitious effort is a computer program by Berwick's graduate student Sandiway Fong – it can already "parse" or diagram, sentences in English and parsing in languages as disparate as Spanish, German and Japanese is well under way. Not only that, but the program handles all the languages with the same set of about 25 bare-bones rules. And it can take on amazingly complicated syntactic constructions – as well as the same awkward, ill formed language that everyone produces every day and that everyone some how understands. By contrast, most other computer programs that analyse grammar incorporate hundreds of complex rules for every conceivable type of sentence in however many languages they are geared for. Then, after all that, they work only with relatively simple prose.

Like all the other work from Berwick's group, Fong's program is based on a theory that dates from 1957, when fellow linguist Noam Chomsky, also at MIT, published the book *Syntactic Structures* and changed his field forever. Before he came on the scene, researchers viewed language almost exclusively as a collection of habits acquired through conditioning. Learning to speak was supposedly like learning to ride a bike or catch a ball – you observed, tried and tried, tried again. Chomsky disagreed violently, arguing that language is based on broad structural principles, the knowledge of which is inmate in human beings, part of our genetic endowment.

What that means is that each of us develops language naturally in the normal course of events, much as we grow arms and legs, Chomsky

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went on. Our experience in the world does not supply linguistic knowledge but simply awakens and enriches it. Accordingly, he says, all languages, however different they might seem, share common parameters – a "universal grammar".

Such ideas have gained acceptance in many cricles over the years but remain controversial. One reason is that they assume there is such a thing as human nature : Although this notion is coming back into vogue in the social sciences, you still don't have to look far to find a psychologist or a sociologist who insists that our minds are shared solly by our environment. Yet Chomsky has raised backles even among those who do believe in human nature that his theory presupposes. He believes our minds are inherently "modular", consisting of separate systems such as his personal favourite, the language faculty. All the systems have their own properties and are independent of any basic learning mechanisms – if indeed such mechanisms exist, Chomsky hastens to add. The very idea is anathema to legions of researchers who have spent their careers trying to define and assess general intelligence.

Fong's parser would seem to lay many of these quarrels to rest. After all, it relies entirely on principles of universal grammar and it's an ordinary computer program that is about as modular and dis-connected from basic learning mechanisms as you can get. Other people have built similar systems – Berwick estimates there are about half a dozen worldwide, but this one alone can take a wide range of sentence types and deal with multiple languages. What's more, it works. You sit down, type in an English sentence, and wait a few seconds while some boxes in a column on the right-hand side of the screen flash on and off. Before you know it, a precise grammatical analysis leaps into view. Then you make a few minor adjustments that enable you to do the same with a sentence in Japanese or German or Spanish.

Michael Kashket, another student of Berwick's, is using a similar approach to do electronic parsing of the Australian aboriginal language

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Warlpiri, whose almost orbitrary word order poses a special challenge to universal-grammar theorists. And yet another student, Bonnie Dorr, has made inroads into computer translation, devising a program to perform that feat between English, Spanish and German for some kinds of sentences. Chomsky himself, who is hardly prone to empty praise, calls the achievements of Berwick's group "impressive". They bring linguists closer to understanding how language works. But just how much closer is still a matter of debate.

"To Decode, Hold This Message Up to a Mirror"

A few years ago, when Berwick started to explore computer applications of universal grammar, his first goal was simply to see if anyone could pull it off. Several people had suggested that it just wasn't possible.

What gave him the nerve to proceed was not only his faith in Chomsky's ideas themselves, but his interest in how they have evolved through the efforts of linguists all over the world. In the early days of work on universal grammar, he observes, linguists – including Chomsky – still didn't know how to get to the deep levels of language to actually see the broad structural principles that the theory assumes. But these researchers kept tinkering away and finally, in 1981, Chomsky came out with *Lectures on Government and Binding*, which puts decades of small but significant advances together into a coherent whole.

The refined "principles and parameters" version of universal gramar possesses a compelling simplicity and elegance, Berwick notes. For example, in the theory's previous incarnations, rules had a daunting task – they were supposed to describe both the underlying syntactic structure of a sentences and the roles of the various words. The new, improved work, on the other hand, recognizes that structure can be considered by itself.

This key insight makes computer parsing on the basis of Chomsky's theory much more feasible. One part of a program can zap through a number of possible "tree diagrams" – the diagrams used to map syntax – and other

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parts can test out the words to see if there is a way to hang them all on any one diagram and still not violate certain grammatical constraints. When the program finds the tree diagram that can accomodate every word and every constraint, the sentence is parsed.

The realisation that structure can be considered independently has also yielded another discovery, one that makes the job of computer parser easier still. For all the world's languages, there are two fundamental types of structure, each the mirror image of the other. The first type is the structure used in English, where verbs tend to begin verb phrases, nouns noun phrases, prepositions prepositional phrases and so on. Thus in a straight forward English sentence such as "The pencil on the table is red", the noun "the pencil" marks the beginning of the noun phrase "the pencil on the table". And that noun phrase contains the prepositional phrase "on the table", which, predictably enough, starts with the preposition "on". Finally comes the verb phrase "is red".

The other type of structure is found in languages like Japanese, where certain important ordering principles are reversed. Here verbs, for instance, are at the end of the verb phrases instead of the beginning – while English speakers say "Japanese eat Sushi", Japanese speakers say "Japanese sushi ear". As young children, human beings presumably can adapt to either of the two fundamental strucures. Chomsky speculates that it's as if there were an array of switches in everyone's head. These switches get set one way for those who grow up hearing Japanese and they get set the other way for those who grow up hearing English. With a principle and parameter parser, the switches can be set and reset with a few keystrokes.

That leaves the problem of how to hang the words of a given sentence on its appointed tree diagram. The series of 25 or so grammatical constraints that the programs from Berwick's group consult to accomplish this feat also comes from *Lectures on Government and Binding*. Berwick compares these rules to atoms : They can combine to give you a compound that is very complex, he remarks, but taken by themselves, they are quite simple.

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For example, one constraint dictates that subjects and objects must receive "case", which helps define the part they play in a sentence. Subjects of a main verb receive one kind of case, objects of it receive another, objects of prepositions receive yet another and so forth. A second constraint specifies that verbs must assign "thematic roles" to particular words – typically cues that say who (or what) did what to whom (or what). Exactly what kind of thematic roles are called for depends on the definition of a specific verb. The verb "eat", Berwick explains, implies both an eater and a thing eaten, whereas "put" implies not only a "puter" and a "put-ee" but a place where the putee is put. He points out that "John put the book" is odd, that it needs something like "on the shelf ". A principle-and-parameter parser, consulting its built-in dictionary, is apprised of this and looks for a word or phrase within the sentencee that fills the bill.

And parsing paves the way for computer translation, since it lays the strcuture of a sentence bare. Chomsky's theory holds that all human languages are spoken and written with reference to the same handful of grammatical constraints, so translation becomes just a matter of finding out how those constraints might determine the structure of a sentence in a second language and how words in the second language might fit within the structure.

Beyond Subjects and Verbs

As excited as Berwick is about the projects he and his students have been laboring over, he is up-front about their limitations. For translating, the principle-and-parameters approach compares favorably with the competition, he assets, but he also admits that that's not saying much. Researchers have been trying to get machines to do translations since the early 1950's, when the U.S. Air Force decided this might be just the thing for intelligence gathering – the difficulties have proved far more formidable than anyone had anticipated. Enlisting the insights of the universal-grammar theory doesn't eliminate those difficulties; it just cuts down on some of them. Ask Berwick whether computers could ever replace human beings as translators and he will simply smile and reflect that it's an interesting question.

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He acknoledges, for instance, that as good as principle-and-parameters programs are at teasing out syntactic structure, they hardly even touch on broad questions about what any sentence might actually be saying. In other words, the whole conceptual world that a sentence calls up in our minds – the cultural nuances, the ambiguities, the shades of meaning – remains largely terra incognita. And it's just that conceptual world that many of Chomsky's critics, stressing the environmental influences to which we are subject, have faulted him for ignoring.

However, Chomsky contends that a lot of so-called broad questions end up having less to do with environmental influences than people think. He would never deny that culture has a role in shaping thought – and he seems even more leery than Berwick about making grandiose claims for any program's possibilities as a translator – but he is conviced that much of our conceptual universe is coded into our genes along with the principles of syntactic structure. It's all part of our language module and so intrinsic to our being that no translator, machine or human, even has to deal with it.

He points out to the word "climb". If you think about it, he says, you soon find that this concept is not so easy to explain. It's often something people do with their hands and arms. If often means going up, yet it can also mean going down. The definition, in short, is more complicated than you would ever imagine. "But every child learns it perfectly right away", he observes. "Now that can only mean one thing. Namely, human nature gives us the concept 'climb' for free". He goes on to submit that the same is probably true for most concepts embodied in words. "This is the way we learn language. We simply learn the label that goes with the pre-existing concept".

And among the pre-existing concepts we find labels for are many that generate the underpinnings of sentence structure–concepts such as those that include some notion of causality. Thus syntax can extend far beyond what everyone was taught in school about subjects and verbs and relationships between pronouns and their antecedents. "Syntax in a wider

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sense", Chomsky points out, "is the study of symbolic systems. It's the study of how one sentence can imply another. For example, if I say 'John killed Bill', it implies the sentence 'Bill is dead'. We understand the implication because we are born knowing not only about death but about causality, both of which are bound up in our word "kill", whose definition is "cause to die".

Working on the Lexicon Project, a longstanding linguistics research program at MIT, Chomsky's colleague Ken Hale investigates sentences from this perspective, and the seconds the notion that there is more to syntax than meets the eye. Hale has been taking a long, hard look at expressions like "bank the money", which happen to raise some vexing issues. You can say "bank the money" but not "church the money". Why ?

To many people, the explanation would seem to be that the profound cultural meanings attached to banks and churches make such an utterance impossible. Yet Hale has discovered that at a deep level, "bank the money" takes on a syntactic structure very different from the one "church the money" would if we were capable of saying such a thing. "Abstractly, 'bank the money' can be represented as something like 'cause the money to go into a bank' or 'put the money in a bank,'" he notes. "But we don't put our money in a church. Instead, we give our money to it, and the syntax of that phrase is just not the same".

Still, even if all languages do share universal principles and concepts, that dosen't necessarily mean those principles and concepts are innate. Recent articles in newspapers and such magazines as the *Atlantic* and *Scientific American* seem to suggest an alternative explanation. Vitaly Shevoroshkin, a linguist at the University of Michigan in Ann Arbor, believes every language on Earth probably evolved from a single ancient tongue spoken in Africa any where from 50,000 to 150,000 years ago.

* * *

However, just because the similarities among languages might have a historical base dosen't mean they don't have a biological base as well,

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(Hale) points out. The mutation that gave rise to linguistic ability might have occurred only once and spawned a single language to which all others are ultimately related. Chomsky adds that the history of language is irrelevant to anyone's childhood task of picking up English or German or Swahili. No matter what happened linguistically thousands of years ago, all human beings who are born into the world still have to master a language all by themselves on the basis of what is, when you stop to consider it, rather limited experience. In other words, (linguistic historians) don't really challenge universal-grammar theory at all.

Journey to the Center of the Brain

The same cannot be said of Philip Lieberman, chair of the department of cognitive and linguistic sciences at Brown University in Providence, Rhode Island. Lieberman affirms that some aspects of language are innate in human beings, and he also thinks the research from Berwick's group could go a long way toward corroborating this. But he cautions against accepting universal-grammar theory whole hog, and not just because it tends to downplay the importance of environment. He argues that human nature, which he believes in at least as strongly as Chomsky does, is much more complex than such a theory implies.

To understand what goes on when we use language, we have to take our evolutionary heritage into account, he explains. And once we do, Chomsky's central ideas about what the brain is like begin to break down–the organ cannot conceivably be as modular as he thinks. For one thing, the specialized mechanisms we have for "higher", more complicated activities have evolved from those for more basic tasks. Thus the same areas of the brain that regulate body temperature and control skeletal muscle figure prominently in memory. They play a role in our ability to feel pain and pleasure, too. "The brain mechanisms that make human language and thought possible probably also continue to participate in older, simpler activities", Lieberman writes. "Extreme modularization is most unlikely".

Studies of brain-damaged patients back him up. For example, harm to the basal ganglia, a part of the brain associated with motor activity and

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derived from our reptilian past, produces speech, language and cognitive deficits.

Lieberman charges that universal-grammar theory short changes the role of learning as well. Some of our apparently innate knowledge might actually come from the general learning mechanisms Chomsky is so dubious about, he says. As evidence, he cites work with "distributed neural networks", computer architecture designed to mimic the biological circuitry of the human brain.

Such research indicates that we formulate broad principles from sets of slightly different examples and then use those principles to make sense of our experience. For instance, Lieberman observes, the systems can "learn" to identify dogs by "extracting a prototype construct of dogginess" from a collection of pictures of "dogs and other quadrupeds". He sees no reason why the same kind of process might not contribute to language acquisition.

One Chomskyan rebuttal would be that the language to which children are exposed is too imperfect to provide them with workable principles of grammar, but says Lieberman, imperfection doesn't matter. For these purposes, sentences would need to be grammatical only about 60 percent of the time.

Chomsky, however, remains unimpressed with neural networks and what thay seem to suggest about learning. "You can take those proposals seriously when they become concrete", he says. "Yes, may be there are techniques we use to formulate principles, but let's see them. If you can give me some that yield the principles Berwick and his students are using in their computer programs, fine–we have something to talk about. But not until then". He is even more dismissive of Lieberman's thoughts about modularity. "Lieberman is missing the point", he remarks. "It could be that a section of the brain, a particular piece of meat, is involved in diverse functions, but that has nothing to do with what "I am saying", The gist of his ideas, he explains, is that parts of the brain work together in one way to accomplish a task like crossing the room. A module is a mode of organizing neural responses, not a concentration of neural tissue.

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Creativity and Rules

What such tight arguments don't completely address is the subjective experience of language. Granted part of that experience is the lightning speed with which we grasp complex verbal constructions, and Chomsky's ideas do give us a way to understand this : If we are born with a module for linguistic knowledge, then such a phenomenon is almost inevitable. But there's also the question of how our thoughts and reactions come into play, and that's one area where Lieberman's views are compelling. Anyone who has waxed unnaturally articulate during an argument is prone to suspect that aggression and other primitive impulses must somehow be intimately connected to language mechanisms.

On the other hand, just as Chomsky acknowledges that cultural and environmental influences exist, he is aware that thoughts and reactions are part of our lives. He notes, though, that it's simply not useful to put together theories about subjects we don't understand and thoughts and reactions come under this heading.

While Lieberman strives for a vision of human nature that integrates every aspect of our experience, Chomsky is concerned about the violence we might do to truth by defining anything too soon. He maintains a respectful distance from what he feels we aren't equipped to know yet : He agrees that there must be some relationship between language and everything going on in our heads, but he won't presume to say what it is. Instead, he trains his attention on a more immediate question – how human beings are able to express their thoughts and reactions in endlessly novel yet entirely appropriate ways. In conversation, for example, two people may agree, but they certainly don't say the same thing verbatim.

It's a focus that's consistent with his radical political philosophy, which has earned him even more fame than his work in linguistics. An avowed anarchist, he places a high value on personal autonomy. He believes that social co-operation can flourish largely without coercion from the state–that, in fact, the state should stay out of such matters as much as possible. He is convinced that all human being are possessed of a drive toward creativity, which expresses itself not only in art but in everyday life. Put simply,

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Chomsky holds that each of us, as human beings, has an almost incorrigible tendency to respond to things in our own way.

The idea that we are all born with the same mental hard-wiring may seem to contradict this, but according to MIT political scientist Joshua Cohen, who has written at length on Chomsky's social thought, just the opposite is true. Cohen observes that for Chomsky, the "intrinsic structure" of the human mind – the mental hard-wiring itself – is what "underwrites the possibility of creative activity". It does so just by establishing a context within which to exercise such activity – a shared human frame work. In other words, it sets up the parameters that not only give form to our efforts but allow others to understand them. Without parameters, any attempt to communicate degenerates into meaningless noise.

Not surprisingly, then, it is linguistic parameters per se that continue to engage Chomsky's energies, not so much the substance of what people say to one another. When it comes to the computer programs from Berwick's group, he seems almost bored by the prospect that any of them might do translations. He is not animated until he is talking about their parsing abilities, which, he says, have sharpened universal grammar theory. For example, Berwick and his students have an easy way of knowing when a principle they are working with is poorly defined : It produces a bad parse. Also, the slight adjustments they need to make in a program when they want to parse in different languages shed light on how those languages may vary within the confines of universal grammar. "The study of parsing", Chomsky points out, "is very likely to tell you things that will be of interest about the nature of language". And that, after all, is what he has been trying to do for more than 40 years.

About the Author : Beth Horning is an associate editor of Technology Review. She has master's degrees in English and education from Indiana University.

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KEY-NOTE ADDRESS

(Extract - Section II & III)

K. T. Pandurangi

It may interest you to know that the अपौरूषेयत्व *(Apauruṣeyatva)* concept of language developed in India, has already treated the language as impersonal and autonomous. The speaker or listener are irrelevant for *Apauruṣeya* language. *Apauruṣeya* language is demonstrated to be autonomous at three important junctures of language viz., word and meaning relation, sentence formation and the formation of a discourse consisting of more than one sentence. The meaning of a word is not fixed by any human or divine agency. It is inheritently related. When a meaningful expression is expressed, its meaning is also expressed. The two are manifested or arise together. **औत्पत्तिकस्तु शब्दस्य अर्थेन सम्बन्धः - शाबरभाष्यं** (*Autpattikastu śabdasya arthena sambandhah - śâbarabhâṣya*)

Similarly, *Apauruṣeya* sentences are not formulated by any human or divine agency. Every sentence communicates an activity. The verb is the focal point for the semantic organisation in a sentence. All other words contribute to it without any external agency formulating their course.

तद्भूतानां क्रियार्थेन समाम्नायः अर्थस्य तन्निमित्तत्वात् (जै.सू)

(Tadbhûtânâm kriyârthena arthasya tannimittatvât - jai. sû)

Therefore, nobody need formulate an *Apauruṣeya* sentence. The words in a sentence take care by themselves to contribute to the communication of the activity concerned by appropriately relating with it.

Similary, a discourse is also autonomous. We need not envisage any person behind it who has organised its theme, its unity, and its driving point.

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A set of internal guidelines are evolved to identify the theme of the discourse, its unity, and its driving point. These guidelines are known as *Upakrama, Upasambâra* etc.

उपक्रमोपसंहारौ अभ्यासोऽपूर्वता फलम्।
अर्थवादोपपत्ती च लिङ्गं तात्पर्यनिर्णये॥ (म.भा.)

(Upakrmopasambhârau abhyâso'pûrvata phalam
Arthavâdopapattî ca lingam tâtparyanirnaye - ma. bhâ)

Thus, *Apauruṣeya* language is autonomous in respect of word meaning relation, sentence formation, and discourse formation. Since we would like to make our computer representation of knowledge autonomous it is worthwhile to study the guidelines laid down in this respect.

Another important aspect of *Apauruṣeya* language is, its intrinsic validity. The flawless language communicates valid knowledge only. Distorted or doubtful communication is no communication at all. To say that a statement communicates but the knowledge communicated is not valid is a contradiction.

ब्रवीति वितथं चेति विप्रतिषिद्धमेतत्।
(*Bravîti vitatham ceti vipratiṣiddhametat*)

Both *Bhâtta* and *Prâbhâkara* schools of *Mîmâmsâ* give such an autonomous status to the *Apauruṣeya* language. The Prâbhâkaras go a step ahead and say that *Pauruṣeya* language is only a form of inference and not an independent vehicle of knowledge. Thus *Śabdapramâna* is a *pramâna* only if it is autonomous.

III

The *Nyâya* school on the other hand makes the language dependent upon the man at all the three junctures of the language viz., the word meaning relation, formulation of the sentence, and the formulation of a discourse. The

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meaning of a word is fixed by human convention. Sentences and the discourses are formulated by the speaker. *Tâtparyajñâna* i.e, envisaging the intention of the speaker plays an important role in ascertaining the knowledge represented in the language according to *Nyâya* school. In spite of all this, the *Nyâya* school also depends upon good many internal guidelines within the language for ascertaining the knowledge represented in the language. The *Nyâya* also recognises the autonomy of the language in certain respects. To make the Computer representation autonomous, these internal guidelines may be studied.

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EXCELLENCE OF THE SANSKRIT LANGUAGE

K. S. Varadacharya

Translated by : **H. V. Nagaraja Rao**

Many scholars have discussed and elaborated on the special features or excellence of Sanskrit Language. After it was announced by some that Sanskrit is suitable for computerisation, interest in this subject has increased. Some are of the opinion that Sanskrit is the natural language because it took its form at the very beginning of creation. It is a fact that all languages are natural. None can impose an artificially created language on the people. So, in one sense, all languages are natural. But, when one says that Sanskrit is the natural language, it is not just because of that reason.

One has to find out when was this Sanskrit language born and how. "In the beginning, the language spoken by folks was *Prâkṛta*. When great grammarians like *Pânini* gave it a refinement, it became Sanskrit". This is the view of some people. But, this is not acceptable. The attempt is made to write a grammar of a language only when it has attained a certain level of development. Even in great treatises like the *Mahâbhâṣya*, it is said that grammar is a description of words in popular use. There is also a proverb which says that grammarians take resort to popular usages. So, it is wrong to say that Sanskrit was born from *Prâkṛta*. On the contrary, to say that Sanskrit gradually became *Prâkṛta* would be more reasonable.

One should contemplate on an essential point - the word *vyâkaraṇa* (grammar) is seen in the Upanisads also. *"Taddhedam tarhyavyâkṛtam âsîttannâmarûpâbhyâm vyâkriyata"* (*Bṛhadâraṇyaka* 3-4-7), *"nâmarûpe vyâkaravâṇi"* (*Chândogya* 6-3-2), *"Nâmarûpe vyâkarot"* (*Chândogya* 6-3-3), etc. Vedântins are familiar with *Nâmarûpavyâkaraṇa* (i.e., analysis of the name and the form).

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The *Brahmasûtra* 2-4-17, which reads *"Samjñâmûrtiklptistu trivṛtkurvata upadeśât"* is there just for this purpose. In the *Puruṣasûkta* also, the sentence *"sarvâṇi rûpâṇi vicitya dhirah nâmâni kṛtvâ abhivadanyadâste"* is well known. Therfore, there is grammar or analysis of words and also the grammar of forms. The former is known to everybody. This is known also by the titles *śabdavyâkaraṇa* and *śabdasâstra*. But, what is *rûpavyâkaraṇa* (analysis of forms) ?

A potter who desires to make a thing which can be used to bring water will make a thing that is suitable for that purpose, and also possessing the right quality and shape suited to it. Similarly, the forms of animals, birds, reptiles, humans etc., were created by a Creator or by Nature with a purpose only. Otherwise, the question "why does an animal have a particular form?" will be answerless. When a person makes a new machine with a particular purpose, its form will be in accordance with the purpose. The wheel is produced for smooth movement and hence, it has to be round and not square. Similarly, the Creator or Nature, can be expected to produce the things according to its purposes only. So the grammar of things is to give them a shape according to the purpose which it should serve. *Rûpa* means shape. In the *Brahmasûtra,* the phrase *samjñâmûrtiklpti* has been used in the sense of *nâmarûpavyâkaraṇa* . *Klpti* means creation. It is accepted by one and all that in the vedic sentence *dhâtâ yathâ pûrvam akalpayat,* the last word *akalpayat* means 'created'.

Therefore, the creator of this world gives the form and name to each and everything according to the purpose to be served by it at the time of its creation itself. This is the meaning of *nâmarûpavyâkaraṇa*. So *nâmarûpavyâkaraṇa* and creation are equal according to Vedântins.

From this it becomes known that the name of a thing is produced along with its form in the natural way. These two (creation of form and giving it a name) are simultaneous. Such name is that found in the Sanskrit language only. The Sanskrit words become the conveyers of particular meanings because of their etymological derivations. For instance, the word *deva* is derived from the verb root *div* which has the meaning of 'sport', 'desire to win' etc. This is

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śabdavyâkarana. Similarly, one has to guess that *deva* will have a shape or form conducive to such sport etc.

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Thus, all Sanskrit words are produced with a cause. It is said that some grammarians hold that all words are derived from verb-roots. That is why *bhû* etc., are called *dhâtus*. *Dhâtu* primarily means a raw material. On account of this, the words of the Sanskrit language are transparent and their meanings can be easily understood from examining their derivation. For instance, the synonyms for *deva*(God) are *amara, nirjara, tridaśa* etc. When these words are etymologically derived, the form and special qualities of the Gods also become obvious to us. Since the things in the world generally have many forms and qualities, there are many words for every object in this language. By critically examining the words, the state, stature and use of the things are easily understood. That is why Sanskrit is called the natural language. With its proper understanding, the science of creation also becomes known. By classifying things according to their nature, shape, use etc., the knowledge of the world will also be systematic. Hence, Sanskrit is more suited to the computers also.

Again, the most important aspect of language is accent or intonation. Language is, after all, a means of communication. The same word may give different meanings when it is pronounced with different intonations. Sounds like 'hm' which are produced by a sick person indicate the intensity of his sickness. The theory of *dhvani* (suggestion) expounded by *Ânandavardhana* etc., is based on this fact. That is why the principle of suggestion is called *dhvani*. So, the role of intonation in expressing one's inner feelings is very prominent. In Sanskrit, the phonemes, words and sentences are said to have different accents to express different meanings. The different meanings of the word *Indrasatru* (i.e. The slayer of *Indra*, and he, whom *Indra* slays) depending on whether the compound is a *tatpuruṣa* or *bahurvrîhi* are well known. In the sentence from the *Puruṣasûkta* - *"puruṣa evedam sarvam"* - the phoneme '*da*' has to be pronounced with the *udâtta* accent only. If it is pronounced with the *anudâtta* accent, the meaning would be different (i.e. the thing before us is *puruṣa*, and not everything is *puruṣa*). So, accent has an important place in Sanskrit. Those adept in Vedas know this when they chant the Vedas in *varṇa, pada, krama* etc.

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By studying these matters carefully, one comes to know the special features of this language. Due to this, clarity of expression, avoidance of ambiguity etc., are easy in this language.

In Vedic literature, all such points can be clearly demonstrated. Since this language has evolved along with the creation of this world, it is not a product of artificial creation. Hence, it is called *Devabhâṣa*. That is why this is not limited to any one region or society. Like the *devas* (Gods), this language is common to all.

That is why Sanskrit is not a dead language. Just because a language is not used by a particular society at a given age, it does not become dead. Such could be the case of an ordinary language spoken by a limited number of people. Sanskrit, the language divine, is the language of the immortals. It can never die. It may appear dormant due to the bad luck of the people at a given time. But there is no doubt that it will glow in all its glory in future.

Under these circumstances, the responsibility of the Indians in general, and that of the Sanskritists in particular, is very big. May the divine language give us the necessary strength to shoulder that responsibility.

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MAIN SUBSTANTIVE IN VERBAL KNOWLEDGE

N. S. Ramanujathathacharya
Translated by a local *Vidvân* of Melkote

Śâbdabodha is the knowledge generated by words, which are interrelated and arranged in a systematic manner, to form a sentence. This means of communication is called verbal testimony. *Annambhatta* in *Tarkasangraha* defines it thus :

आप्तवाक्यम् शब्दः। (तर्कसंग्रहः - शब्दखण्डः)

(The sentence spoken by a trustworthy person is called *śabda* (शब्द) or verbal testimony.)

However, just a cluster of words which are not interrelated or arranged in a particular manner is not or cannot be called a sentence since it does not convey any sensible meaning. For example :

गौरश्वः पुरुषो हस्तिः। (cow horse man elephant)

Therefore, if a cluster of words has to convey the intended meaning, the words are to have certain particular order and relationships among themselves.

Now, taking a group of four words as an example, i.e.,

गौर्गच्छति अश्वो धावति। (The cow goes the horse gallops)

we see that though there are two sentences giving a sensible meaning, they cannot be called one sentence or one cluster of words giving a specific meaning, since they are not interrelated. Thus the definition of the sentence mentioned above does not hold good in case of the above. Therefore a clause has to be added to this definition as follows :

A sentence is a word the meaning of which is the main substantantive and the meanings of all other words associated with it are the qualifications of that

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main substantive directly or indirectly, the relation differing according to the context. Thus the correct definition of the sentence by the hearing of which (sentence) we obtain knowledge is as follows :

"स्वार्थविशेषणीभूतार्थप्रतिपादकयावत्पदविशिष्टं
विशेष्यभूतार्थप्रतिपादकं पदं एकवाक्यम्"

Hence even the word denoting that main meaning is called the main substantive **(मुख्यविशेष्यः).**

For example let us take the sentence :

रामः वनं शीघ्रं गच्छति। (*Râma* quickly goes to the forest.)

Here it is quite obvious that the word 'quickly' qualifies the word 'goes'. The word 'goes' actually refers to the activity of 'going' **(क्रिया)**, thus telling us that *Râma* is the goer. The word 'forest' refers to the destination of *Râma* i.e. the object of 'going'. This relation is denoted by the word 'to'. Thus in the above mentionted sentence, all the words directly or indirectly are related to the word "*Râma*" and the meaning of this main word qualified by the meanings of all the other words in the sentence, ultimately conveys the purport of the whole sentence. The above mentioned definition of the sentence holds good in case of any sentence we may take up for examination.

This definition has been endorsed by *Bhagavân Jaimini* too :

अर्थैकत्वादेकं वाक्यं साकाङ्क्षं चेदविभागे स्यात्। (2-1-46)

Therefore, we may conclude that the meaning of the main word taken as the main substantive **(मुख्यविशेष्य)** qualified by the meanings denoted by all other words in that sentence, is considered to be the root cause of verbal knowledge **(शाब्दबोध)**. Such a sentence is called verbal testimony **(शब्दप्रमाण)**.

It is too well-known that sentences consist of many words. While so many words exist, the process of identification of the main substantive **(मुख्यविशेष्य)** in the sentence is open to debate. There is difference of opinion regarding the identification of main substantive and (its corresponding) adjectives too. Here, in the process of identification of the main substantive

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(मुख्यविशेष्य) three different theories have been postulated by scholars belonging to three different schools viz., *Vaiyâkaranâs, Mimâmsakas* and the *Naiyâyikâs.*

Theory of *Vaiyâkaranas*

Taking the same sentence "Râma quickly goes to the forest", (रामः वनं शीघ्रं गच्छति।) one can understand that the root 'गम्' or 'to go' is to be taken as the main word since all the other words are centred around the verb (क्रिया). For example, when we ask who goes ? ('कः गच्छति ?') the answer is Râma ('रामः'). To the question where does he go ? ('कुत्र गच्छति ?') the answer is to the forest ('वनम्') and the answer to the question How does he go ? ('कथं गच्छति') is quickly ('शीघ्रं'). Thus one can easily understand that each and every word of this sentence is directly related to the word goes (गच्छति) and fullfils the different aspects of the verb. Therefore it is the meaning of verb (क्रिया) or root (धातु) that is to be taken as the main substantive (मुख्यविशेष्य) in each sentence which in turn qualified by all the other words, conveys the meaning of the whole sentence.

The same can be ascertained by examining sentences like :

'देवदत्तः नीलोत्पलं आनयति', 'यज्ञदत्तः ग्रामं गच्छति' etc.,

where the meanings of the roots denoted by the verbs आनयति, गच्छति are taken as the main substantives in the sentences referred above. Here the meanings of the roots, धात्वर्थ viz., 'bringing' (आनयनं) and 'going' (गमनं) are the main substantives.

Theory of *Mîmâmsakas*

However, the scholars belonging to the *Mîmâmsâ* school of philosophy opine otherwise. This is the summary of their opinion :

In the sentence "*Caitra* cooks rice" (चैत्रः तण्डुलं पचति) we find that without the word 'cooks' (पचति) the sentence '*Caitra rice*' (चैत्रः तण्डुलं) does not mean anything sensible. Thus, the word 'cooks' (पचति) denoting the activity is (to be taken as) the all-important word in the sentence (since that word is indispensible). This word 'cooks' (पचति) consists of two parts, viz. the root 'to cook' (पच्) and the verbal suffix of present tense, third person and singular (ति). While the verb means 'to cook', it is the suffix that actually emphasises the doer of the activity (क्रिया) viz., 'cooking' (पाक) i.e., the suffix precisely

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emphasises the effort (कृति or प्रयत्न) in general, that is required to carry out cooking and also denotes the relation between the doer (कर्ता) and activity to be accomplished (क्रिया). This proves that the meaning of the suffix succeeding the root is virtually more important than the meaning of the root itself.

प्रकृतिप्रत्ययौ सहार्थं ब्रूतः। तयोस्तु प्रत्ययः प्रधानम्।

(The root and suffix together convey the meaning of every word. However, of the two, the suffix is more important.)

Therefore, the suffix of the verb which denotes the effort (प्रयत्न) in general and the relationship between the doer (कर्ता) and the activity (क्रिया) is to be considered all important in any sentence. Therefore, the meaning denoted by the suffix succeeding the root (आख्यातार्थ) is to be taken as the main substantive (मुख्यविशेष्य) in all sentences.

Thus, according to *mimâsakas* the आख्यातार्थमुख्यविशेष्यकशाब्दबोध is more advantageous when compared to the धात्वर्थमुख्यविशेष्यकशाब्दबोध of the *vaiyâkaranas*.

Theory of *Naiyâyikas*

The *naiyâyikas*, nevertheless, in this regard propose a theory in an altogether different perspective. This is their opinion :

So far, according to the opinion of the above mentioned two schools, in every sentence, either the meaning of the root (धातु) denoted by a part of the verb or the meaning of the suffix (प्रत्यय) viz.,effort (भावना or प्रयत्न) which is the part of the verb is to be taken as the main substantive मुख्यविशेष्य in verbal knowledge (शाब्दबोध). These two theories are quite erroneous since, many a times we come across sentences which do not have any word denoting an activity (क्रिया), like 'पण्डितः चैत्रः', 'चैत्र, पुत्रस्ते जातः' etc.

Therefore, one has to accept the fact that the word ending in subjective case (प्रथमाविभक्ति), denoting the subject of the whole sentence is to be taken as the main substantive (मुख्यविशेष्य). An exact example of this is the sentence that is

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quoted in the beginning of this paper. Thus, it is evident that the theory of *naiyâyikas* alone stands the test of any dimension in this regard.

POSTULATION OF A NEW THEORY OF ŚÂBDABODHA

So far the three theories of *śâbdabodha* advocated by different schools of philosophies have been discussed.

Now, a new theory of *śâbdabodha* postulated by *Sri Nigamânta Mahâdeśika* which is generally unknown to the scholarly world at large, and is rarely referred to in a place or two, is explained here:

As earlier, the sentence *caitra* cooks rice (चैत्रः तण्डुलं पचति) can be taken as an example. The word 'cooks' (पचति) consists of two parts i.e., the root पच् to cook, and the suffix ति (suffix denoting the present tense, third person and singular) . According to the aphorism of *Pâṇini* : 'लः कर्मणि च भावे चाकर्मकेभ्यः', it is evident that the meaning of the suffix denoting the tense (लकारार्थ) is either the subject or object. This once again points out to the subject or object of a sentence depending on the voice of the sentence.

In the sentence *Devadatta* cooks rice (देवदत्तः तण्डुलं पचति) the verbal suffix (आख्यात) appearing after the root (पच्) denotes the subject (कर्ता). This is the main substantive in that sentence. Hence the verbal knowledge arising out of this sentence is in this form - the doer of cooking, non-different from *Devadatta*, for which the object is rice (देवदत्ताभिन्नः तण्डुलकर्मकपाककर्ता). Whereas, in the sentence (in passive voice) 'rice is cooked by *Devadatta*' (देवदत्तेन तण्डुलः पच्यते) the verbal suffix appearing after the root पच् denotes the object (कर्म). Taking this as the main substantive one can interpret the sentence as - the object of cooking, non-different from rice, for which the doer (subject) is *Devadatta*.(तण्डुलाभिन्नं देवदत्तकर्तृकपाककर्म)

Therefore, the theory that the meaning of the suffix denoting the subject or object which is said to be the main substantive in *śâbdabodha* (आख्यातार्थ-कर्तृकर्ममुख्यविशेष्यकः शाब्दबोधः) seems to be more logical and correct.

* * *

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PÂNINIAN LINGUISTICS AND COMPUTATIONAL LINGUISTICS

K. V. Ramakrishnamacharyulu

For a long time Artificial Intelligence (AI) people are busy to create an expert system, which can communicate with common man in day to day ordinary language. To achieve this, they started to study and analyse various languages from the computational point of view. Many grammars were developed in this direction, of which some are being called Universal grammars. The existing computational grammars have been developed primarily with European languages in mind. So, most of the grammars are known inefficient for free word order languages, particularly for Indian languages. Though some grammar formalisms like *GPSG are claiming that they are for free word order languages, they are also very slow and inefficient.

Observing the inefficiency of the systems developed in Western style, the Indian AI people wanted to try for a grammar formalism for Indian languages based on Indian traditional grammar i.e. of *Pânini*. An extensive research was done in this direction at Computer Science Department of IIT, Kanpur. The department has succeeded in bringing a system for the analysis of Indian languages based on Pâninian Linguistics. The parser which is developed is also named after the great traditional grammarian *Pânini*.

Naturally the curiosity rose among linguists and computer scientists to know about the Pâninian system.

The following special features of Pâninian system were shown by Ms. Bhânumati, in her M. Phil., dissertation "An approach to machine translation in Indian languages". (P.5)

* Generalised Phrase Structure Grammar (GAJDAR)

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1. Traditional Indian grammar is based on a comprehensive *kâraka* theory, which is again based on *vivakṣâ*. The relations between the related will be determined by *âkânkṣâ* and *yogyatâ* principle, which will also play a key role in resolving the ambiguity.

2. The fundamental difference between the Western generative grammars and Indian generative grammar (i.e. Pâninian) is this: Western grammar takes active form of sentence as a basic, and passive form derived from it. Whereas in Pâninian system, active and passive constructions are same, which are based on underlying semantic structure.

3. Similarly, Western linguistics describes the relation between the structure of sentence and that of nominals by giving them parallel expansion in the phrase structure in X-bar Theory. On the other hand in Pâninian grammar the sentences are no more basic than nominals and vice-versa. *Pâṇini* generates them by rules, which are not just parallel but - aside from morphological details - identical.

4. Another fundamental way in which the traditional theory differs from Western linguistics is the use of *"vivakṣâ"* concept to handle the following constructions.

i. *Râm ne tâlâ kholâ.* (Ram opened the lock)

ii. *Râm se tâlâ khul gayâ.*
(Lock opened itself with the effort of Ram).

iii. *Tâlâ khul gayâ.* (Lock opened itself).

iv. *Châbi ne tâlâ kholâ.* (Key opened the lock).

v. *Châbi se tâlâ khul gayâ.* (Lock opened with key).

The goal of any grammar formalism is to explain the co-relation between the meaning and utterance. (Fig.1)

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Actual meaning

|

Phonetic expression (Fig. No.1)

To achieve this, different systems may have different approaches. As Indian garmmar tradition is based on Advaitic philosophy, it tries to explain the relation between the meaning and phonetic expression with some imaginary steps/stages. Though these are imaginary, they look like real, like the world (*prapañca)* in Advaitic philosophy.

Though the sentence is an undivisible unit, Indian traditional grammar makes some imaginary divisions like word, root, stem, suffix, pre-fix etc., and attributes some meaning to them. All these meaningful units are called "*sphotas* ". (*sphota* - a meaning bearing unit). The sentences are divided mainly into words, and they are categorised into two types as *subantas* (nominals) and *tiṅantas* (verb forms). In a sentence *tiṅanta* is main, and the *subantas* are attributes for it. Where *tiṅanta* is not expressed, verbally there it is treated as understood.

Before going into details, let us first examine the process of language. When a person wants to give an expression to his idea, as a speaker he utters some words. The words, which are perceived by some other person, express the idea of the speaker. Normally, an idea, which is chosen for expression will be an event, in which some action is the central element and the concrete things (natural or imaginary) which co-operate in fulfilling the action are the other elements connected with central element. Normally in a sentence the central element i.e., action or process is expressed by the verb or verbal-noun, and the other elements are expressed by nouns. So, the meaning of a sentence means the relation between action and actors (concrete things). The concerete things which are involved in the action are called *kârakas* (actors/doers). The relations between each individual and each action is quite different and it is impossible to list out the relations or to discribe them in a full-swing. So, taking a common factor in utterance and involvement in action

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into consideration, the relations between the actors and actions are categorised into six types, which are known as six *kâraka* relations. (*kartâ, karma, karaṇa, sampradâna apâdâna* and *adhikaraṇa*). The *kartâ, karma* etc., are codes for a group of relations, which are being cognised by some factors in sentences. So, the *kartâ* etc., though they are treated as meanings of some phonetic units, are not real semantic relations, but are only indicators of some groups of relations. The particular relation will be cognised by inference. This will be clear with the following examples.

vi. The city is growing fast.

vii. The boy is reading a book.

viii. The village vanished.

ix. The lady is cooking rice.

x. He looks at the picture.

xi. Rama was born in Ayodhya.

In the above sentences city, boy, village, lady, he and Rama are treated as *kartâs* as per Pâninian theory. But the relations are quite different from each other. Even then, they are called *kartâs*, due to some common factors (i.e., the agreement with verb, active form of the verb etc). So, this is an established fact that different relations are grouped as one and named as *kartâ* etc.

To generate a sentence from an idea, *Pâṇini* introduces a procedure of four steps.

- Actual meaning or idea.

↓
- Assignment of *kâraka* relations.
  (i.e., reconstruction of meaning with *kâraka* codes).

↓
- Assignment of *vibhaktis*.

↓
- Actual phonetic expression (Fig.2).

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To come from first to fourth stage and vice-versa, *Pâṇini* introduces two intermediate stages, which are quite imaginary. In Pâninian theory, the whole generation process is based on *kâraka*-structure only which is an imaginary one, and not on the actual meaning or idea of the speaker. As such the base-structure for all varieties of sentences, i.e., active, passive and so on, is the underlying *kâraka*-structure. This *kâraka* theory is the heart of Indian traditional grammar formalisms.

The differences in sentences i.e., active, passive etc. are mainly based on the words, which denote action. The words are of six types.

W O R D (which denotes action)

Tiṅanta (Verb form)
+ *Kâraka* + Number
+ Tense + Modality
+ Person - Gender

- *Kartṛ vâcya* (Active) (for all roots)
- *Karma vâcya* (Passive) (for all transitives)
- *Bhâva vâcya* (Passive) (for intransitives)

Kṛdanta (Nominal base)
+/- Tense +/- Modality
+/- Person +/- *Kâraka*
- Number + Gender

- *Kartṛ vâcya* (Active) (for all roots)
- *Karma vâcya* (Passive) (for transitives only)
- *Bhâva vâcya* (for all roots)

(Fig. No. 3)

1. *Kartṛ vâcya tiṅanta* - The verb form denotes *kartâ* & action
2. *Karma vâcya tiṅanta* - The verb form denotes *karma* & action
3. *Bhâva vâcya tiṅanta* - The verb form denotes only action
4. *Kartṛ vâcya krdanta* - The nominal denotes *kartâ* & action
5. *Karma vâcya krdanta* - The nominal denotes *karma* & action
6. *Bhâva vâchya krdanta* - The nominal denotes only action

According to the Pâninian theory, in *tiṅanta* the action is main and the *kâraka* is subsidiary and in *kṛdanta* the *kâraka* is the main and action is

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subsidiary. That is why no *kṛdanta* will be capable to be the finite verb. The following are the examples for the above categories.

xii. *Râmah grâmam gacchati* (Rama goes to a village)

xiii. *Râmeṇa grâmah gamyate* (A village is gone by Rama)

xiv. *Râmeṇa sthîyate* (stay by Rama)

xv. *Râmah grâmaṃ gacchan* ... (Going to a village,by Rama)

xvi. *Râmeṇa grâmah gamyamânah* ... (Village being gone by Rama)

xvii. *Râmeṇa grâmasya gamanam* ... (The going of village by Râma)

In all these sentences the *kâraka* relations are the same. *Râma* is *kartâ* and *grâma* is *karma.* But in each expression there is a difference particularly at the end of the nominals and verb forms. *Râmah, Râmeṇa,* both denote *kartâ,* where as *grâmah, grâmaṣya, grâmam* all the three denote *karma.* In all these words stem/root is the same, but difference is at the endings. To explain the difference *Pâṇini* devides the words into stems/roots, and suffixes. He calls the nominal and verbal suffixes as *vibhaktis.* According to *Pâṇini* the *vibhaktis* are indicators of *kârakas* and their relations with action.

The verbal suffixes are called *tiṅ-vibhaktis,* and they denote *kartâ karma* and action. The nominal suffixes are called *sup-vibhaktis,* which are divided into seven types. They denote all *kârakas* and their relations and other relations.

As per the traditional system each *vibhakti* has a link with some *kâraka.* Except (I) *prathamâvibhakti,* the others are fixed for some particular *kârakas* as mentioned here.

Dvitîya	(II)	*Karma*
Tṛtîya	(III)	*Kartâ/Karana*

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Caturthî	(IV)	*Sampradâna*
Pañcamî	(V)	*Âpâdâna*
Saptamî	(VII)	*Adhikaraṇa*
Ṣaṣṭhî	(VI)	*Kartâ/Karma* - Relations other than *kâraka* relations.

Where the word meant for action is *kartrvâcya* (active form) *dvitîyâ* (II) should be used to denote *karma*. Likewise where the word is *karmavâcya* or *bhâvavâcya*, *trtîyâ* (III) should be used to denote *kartâ*. For other *kârakas* the *vibhaktis* are fixed in any verb-form. When the word meant for action is a *kṛdanta*, then the *karma* and *kartâ* are denoted by *ṣaṣṭhî* (VI). This *sasthi* is called *kâraka-ṣaṣṭhî*. Non-*kâraka* relations i.e., relations between two concrete things are also denoted by *ṣaṣṭhî*. This is called *sambandhaṣaṣṭhî*.

It is already noted that in *kartṛvâcya* only *karma* will have *dvitîyâ* (II) *vibhakti*, and in *karmavâcya* & *bhâvavâcya* only *kartâ* will have *tṛtîyâ* (III) *vibhakti*. Now the question arises which *vibhakti* will be for *kartâ* in *kartr vâcya*, and for *karma* in *karmavâcya*. The answer is *prathamâ* (I). *Prathamâ vibhakti* denotes the same *kâraka* which is meant by *tiṅ-vibhakti*.

Actually the *kartâ* in *kartṛvâcya*, and *karma* in *karmavâcya* are denoted by verbal endings i.e., *tiṅ*-suffixes. So, there is no necessity to express the same relation again. But there is a necessity to express the related with action, with these relations. This is called agreement with verb. The agreement part will be taken care of by *prathamâ*. That is why the noun in *prathamâ*, which has agreement with verb is being treated as main word in a sentence by *Naiyâyikâs* (Indian logicians). The western grammars also mostly treat this as subject.

We can conclude the above discussion with the following sum up.

1. For generation *Pâṇini* made two imaginary steps;
   a) *Kâraka* assignment
   b) *Vibhakti* assignment.

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2. The *kâraka* assignment stage will be the base for syntax.

3. The *vibhakti* assignment stage will be the base for morphology.

4. After *kâraka* assignment the speaker should choose the verb form first (i.e., one from the forms *kartṛvâcya* etc.) That is why grammarians treat the verb as main in a sentence.

5. The *vibhakti* assignment is based on the verb form.

6. The agreement part will be taken care of by *prathamâ*.

Though *Pâṇini* developed the system for Sanskrit, this can be applied for all free-word-order-languages. All Indian languages had their traditional grammars, based on Pâninian grammar. So this system can be easily adopted than any other system.

Where the Pâninan system is not suitable in total, suitable changes can be made within the Pâninian frame work.

The procedure for generation itself will be the parsing procedure in reverse as shown below.

- Phonetic expression

↓

- *Vibhakti* assignment

↓

- *Kâraka* assignment

↓

- Actual meaning or idea. (Fig. No.4)

For translation systems, in parsing, after morphological analysis, we have to first identify the *vâcya* of the verb. Afterwards, the *vibhakti* should be identified. After that only we can assign *kâraka* codes for each noun, which becomes the intermediate representation and base for generation procedure. The parsing and generation procedure can be shown as in Fig. 5.

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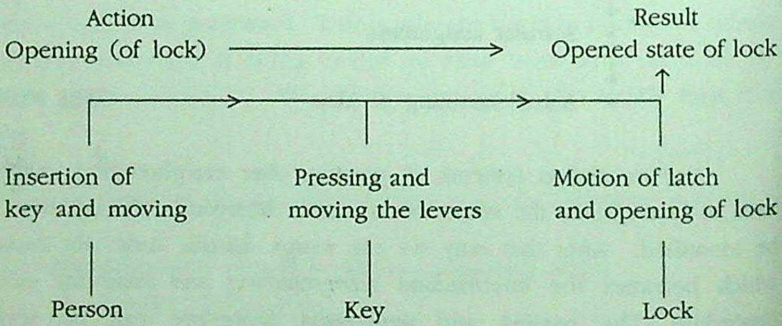
PARSING		**GENERATION**
INPUT		OUTPUT
↓		↑
•	Morphological analysis	•
↓		↑
•	*Vibhakti* assignment	•
↓		↑
•	*Kâraka* assignment	•

(Fig. No. 5)

The above discussion gives some idea about the Pâninian generative technique and its relevence to computational linguistics.

Now we will work out some more details about the *kâraka* theory. It is already stated that the things, which are responsible for the fulfilment of an action are called *kârakas.* What is an action ? Is it one or many ? To answer these we examine the event "Opening of a lock". In this event atleast three things are involved: a person, a key and a lock. So these three are called *kârakas.* How they become *kârakas* ? Is there any action of their own to call them *kârakâs* ? Yes. Let us work out the details of the event opening. There are so many actions involved in it. Each thing involved in it has its own action. With its action only, it becomes a cause for the result of the action. Observe Fig. No. 6.



(Figure No. 6)

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So, there are atleast six actions in this event. So an event means not a single action, but a group of actions in one order.

In these six the first two are of the person, and the next two are of the key and the last two are of the lock. The things which are involved in an event, are *kartâs* for their own action. That is why they are called *kârakas*. In the point of view of the creation of result they will become *kartâ*, *karma* etc., due to some priorities.

All these actions, which are shown in fig. 6, are not meant by verb. The verb denotes only an action of one *kâraka* (which is intended to be focussed by the speaker) and the result of the action. Normally that will be of agent (+ animate). (See the sentence No.i).

Some times the speaker wants to communicate some peculiarities of other *kârakas* than the agent. Then he changes the focus from the action of the agent, to the action of some other *kâraka*, which action is intended to be focussed. Here itself, if he wants to focus the ability of the key, then he intends to communicate its action by the verb. Then automatically the key becomes *kartâ*. (See the sentence No. iv) Likewise when he wants to communicate that the lock is useless or the opening was without much effort, then he intends to communicate the same, intending the action of lock as the meaning of the verb, (See the sentences ii, iii & v).

So, the action which is intended to be focussed will become the meaning of the verb and the *kâraka* of which action is meant by verb becomes *kartâ* in that particular sentence. Normally the *karaṇa* (instrument) *karma* (direct object) and *adhikaraṇa* (location) besides *kartâ* (agent) may become *kartâs*, with the intention of the speaker. The speaker has liberty to ignore some actions of the event, and to focus on some perticular action. This is called *vivaksâ*. This plays a key role in Pâninian *kâraka*-theory, without which we can not explain the sentences (ii, iii, iv & v). This type of sentences are very common in any language.

As such we have examined some main features of Pâninian technique, which are quite relevant for computational linguistics. If we reconstruct the

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Grammars of all Indian languages on the lines of *Pânini*, they will certainly help not only the machine-man interaction, but also help to understand the peculiarities of those languages.

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PRINCIPLES OF MÎMÂMSÂ FOR NATURAL LANGUAGE PROCESSING

P. Ramanujan

Introduction :

The *Mîmâmsâśâstra* is variously described as the science of knowledge (or Epistemology), study of Vedic text interpretation, Science of Sentence and Science of Instruments of Knowledge. However, it has not received the attention it richly deserves probably due to the difficulty in mastering Vedic texts and rituals which is considered a pre-requisite for its study and the complex structure of Vedic passages. Nevertheless, it is such a veritable treasure-house of basic ideas and principles, most notably, common-sense-related ones, that it will be immensely beneficial in devising suitable heuristic rule-base at Discourse level of Natural Language Processing (NLP).

Having claimed this, we should also objectively look into the contents of the *śâstra* for ways and means of understanding, assimilating and then adapting its tenets in Natural Language Processing. In this direction, a small step taken by C-DAC, working in its DESIKA package, is presented here. The fundamental details are only mentioned here, while a detailed discussion would have to await our progressing a lot more in this direction. If interest and receptivity on the topic is aroused by this paper, it would have served its purpose.

Mîmâmsâśâstra

All the branches of Oriental learning have Vedic texts as their foundation. Knowledge relating to the four-fold objectives of morality, material gain, worldly desire and spiritual liberation is contained in the whole of Vedic literature. The whole mass of vedic text was classified into four vedas with numerous

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branches in each, by sage Vyâsa. He also propagated these Vedas with a detailed set of Sâstras to aid in their understanding. The Vedic texts are in poetic, prose and mixed forms in their different sections like *Sambita, Brâbmaṇa, Upaniṣads* etc. The branch of *Mîmâmsâ* is meant to devise means of analyzing and interpreting vedic texts/passages with a view to bring out their tenets, specifically, *Dbarma* (which of course, defies proper translation in English). The word *Mîmâmsâ,* per se, means 'sacred discussion (about a sacred subject)'.

Jaimini took up the task of providing the necessary methodology for interpretating Vedic text in their application domain which is mainly sacrifices. In this task, the *Kalpasûtras* which are one of the Vedic auxiliaries and *Dbarmaśâstras* (which is another supplementary science like *Mîmâmsa*) are also closely related. The applications specified by Kalpa Sûtras are arrived at on the basis of the generic principles established in *Mîmâmsa.* We also find the criteria involved in such a determination explicitly mentioned. We here outline the contents of one typical branch of Vedas, the **तैत्तिरीयशाखा** (*taittirîyasâkba*) of **कृष्णयजुर्वेद** *(kṛṣṇayajurveda)* which is the principal text discussed in great detail in *Mîmâmsâsûtras.*

कृष्णयजुर्वेदः *(kṛṣṇayajurveda)*

The text is divided into five sections **काण्डाः** *(kâṇḍâb)* called **प्राजापत्य,** *(prâjâpatya),* **सौम्य** *(saumya),* **आग्नेय** *(âgneya),* **वैश्वदेव** *(vaiśvadeva)* and **स्वायम्भुव,** *(swâyambbuva)* with hymns pertaining to the deities **प्रजापति** *(prajâpati),* **सोम** *(soma),* **अग्नि** *(agni),* **विश्वेदेव** *(viśvedeva)* and **स्वयम्भु** *(swayambbu) respectively.*

The various sacrifices covered under these sections as follows :

प्राजापत्यकाण्ड् *(prâjâpatyakâṇḍa)* – **पौरोडाशिक** *(paurodâśika),* **याजमान** *(yâjamâna),* **होत** *(bota),* **हौत्र** *(bautra),* **पितृमेध** *(pitṛmedba)* with **ब्राह्मण** *(brâbmaṇa)* and **अनुब्राह्मण** *(anubrâbmaṇa)* ।

सौम्यकाण्ड *(saumyakâṇda)* – **आध्वर्यव** *(âdbvaryava),* **ग्रह** *(graba),* **दाक्षिण** *(dâkṣiṇa),* **समिष्टयजुस्** *(samiṣṭayajus),* **अवभृथयजुस्** *(avabbṛtayajus),* **वाजपेय** *(vâjapeya),* **शुक्रिय** *(śukriya)* and **सव** *(sava)* with **ब्राह्मण** *(brâbmaṇa)* and **अनुब्राह्मण** *(anubrâbmaṇa)* ।

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आग्नेयकाण्ड *(âgneyakâṇḍa)* – अग्न्याधेय *(agnyâdheya)*, अग्निहोत्र *(agnihotra)*, अग्न्युपस्थान *(agnyupasthâna)*, अग्निचयन *(agnicayana)*, सावित्र *(sâvitra)*, नाचिकेत *(nâciketa)*, चातुर्होत्रिय *(caturhotriya)*, वैश्वसृज *(vaiśvasṛja)*, आरुण *(âruṇa)* with ब्राह्मण *(brâhmaṇa)* and अनुब्राह्मण *(anubrâhmaṇa)* ।

वैश्वदेवकाण्ड *(vaiśvadevakâṇḍa)* – राजसूय *(râjasûya)*, पशुबन्ध *(paśubandha)*, इष्टि *(iṣṭi)*, नक्षत्रेष्टि *(nakṣatreṣṭi)*, दिवश्श्येनी *(divaśśyenî)*, अपाघा *(apâghâ)*, सात्रायण *(sâtrâyaṇa)*, उपहोम *(upahoma)*, कौलिकी *(kaulikî)*, सूक्त *(sûkta)*, उपानुवाक्य *(upânuvâkya)*, याज्य *(yâjyâ)*, अश्वमेध *(aśvamedha)*, पुरुषमेध *(puruṣamedha)*, सौत्रामणी *(sautrâmaṇî)*, अच्छिद्र *(acchidra)*, पशुहौत्र *(paśuhautra)*, उपनिषद् *(upaniṣad)* with ब्राह्मण *(brâhmaṇa)* and अनुब्राह्मण *(anubrâhmaṇa)* ।

स्वायंभुवकाण्ड *(svâyambhuvakâṇḍa)* – काठकविधि *(kâṭhakavidhi)* (स्वाध्याय ब्राह्मण) *(svâdhyâyabrâhmaṇa)*.

One peculiarity of कृष्णयजुर्वेद *(kṛṣṇayajurveda)* is that the मन्त्र (hymns) and ब्राह्मण (their explanatory parts) are thoroughly interspersed in a mass of संहिता *(samhita)* and ब्राह्मण *(brâhmaṇa)* text having in all eighty प्रश्न / प्रपाठक (chapters) and about 1234 अनुवाक (paragraphs). To seperate them into the above topics is the main aim of the discourse analysis which should also establish unique coherence of the topic.

Mîmâmsâsûtras of *Jaimini*

To address the problem of Vedic text interpretation Jaimini devised मीमांसासूत्र *(mîmâmsâsûtras)*. The *sûtras* try to (1) assign various functional roles to various sentences, (2) disambiguate word and sentence meaning in terms of context and commonsense reasoning and (3) fixes the correct sacrifice to which the sentence belongs and also the position in it.

Functional Classification

The discussion however, presumes another classification of Vedic text i.e. functional classification. We present an overview here.

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The functional classification of the vedic text is done in order to arrive at the details of the various principal, subordinate, coordinate or supplementary acts, their sequence, filling elipses, extensions and modifications while applying the प्रकृति (model) sacrifice details to the विकृति (evolute) sacrifices.

The functional classes of vedic text arrived at are विधि (injunctions), मन्त्र (hymns) नामधेय (technical terms), निषेध (prohibitions) and अर्थवाद (illustrations) types. Of these the important ones are injunctions in our context. Injunctions are also further classified into उत्पत्तिविधि *(utpattividhi)*, विनियोगविधि *(viniyogavidhi)* and अधिकारविधि *(adhikâravidhi)*. विनियोगविधि *(viniyogavidhi)* further has अपूर्व (applications) गुण (accessories) विशिष्ट (composite) forms.

With the help of मीमांसा *(mîmâmsa)* we arrange the various parts of the vedic text in order of the objective (typically of the sacrifice or topic under discussion), the characteristic and a complete sequence of all activities involved in detail pertaining to each topic for the entire vedic text.

Contents and Arrangement

The tenets of *mîmâmsâ* are crisply contained in the aphorisms of sage Jaimini. There are 2,617 *sûtras* (aphorisms), in 12 chapters, 60 quarters and 907 topics or sections. The subject matter dealt in these are respectively, (chapterwise) : Sources of knowledge, Distinction among rituals, Auxiliary or dependent rituals, Purpose / utility, Sequence or order, Authority, General Extension, Special Extension, Extrapolation/ guessing, its Exceptions, Commonality and Incidence (or universality).

The topics dealt with, quarterwise, are:

Chapter 1 : Characteristic definition of sources of knowledge, discussion regarding prescribed rule, laudatory (illustrative) texts, prayers and remembrances (or recollection).

Chapter 2 : Rituals are said to differ due to six factors like use of a different word (verb), repetition, number, character or type, method and name. Introduction, the six factors, their exceptions and differences of application are discussed.

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Chapter 3 : Dependence is discussed with its definition, characteristics and reasons in eight quarters. The direct scriptual text, indicatory mark (as a means of proof), sentence etc., discord, occurrence, isolated statements, multiple dependency and rituals of the agent (in a sacrifice) are dealt with.

Chapter 4 : Purpose of the various rituals as the instruments of pleasure and otherwise are discussed. Main benefactor, secondary benefactor, utility aspects and lower order auxiliaries are described.

Chapter 5 : Sequence rules are discussed. The six types of sequences based on scriptural text order, meaning, prose order, invocation, section and main orders, their special cases, extension or otherwise and relative strengths or weightages of text etc., are dealt with.

Chapter 6 : Authority to perform rituals is described here. Determination of authorised agents, their qualities, determination of substitutes, privation or exemption of activities, sacrificial discipline, offering and sacred fire aspects are dealt with in the eight quarters.

Chapter 7 : Extended applications are discussed in general. Extension by express instruction, its subordinates, extension by name and indicatory marks are dealt.

Chapter 8 : Special cases of extended applications are discussed under the headings of extension by clear indications, unclear indications, strong indications and their exceptions.

Chapter 9 : The procedure for extending applications is discussed. Extrapolation and guessing issues, extrapolation in Sâma hymns with details, guessing in prayers with details and incident aspects are dealt with.

Chapter 10 : Treats exceptions to extrapolation. Impossibility (chancelessness), its detail, unary frequency of rituals, specialities, certain sacrificial components, sacrificial discussions, miscellaneous topics and negation issues are discussed.

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Chapter 11 : Commonality of certain rituals is discussed. Activities required to be performed once (commonly) for many different rituals, activities to be repeated for different rituals and the details of these two types are dealt with.

Chapter 12 : Incidental nature of certain activities are discussed here. Specific cases, exceptions, uses etc. are dealt with.

Each quarter is further divided into अधिकरण (sections or topics) each dealing with a particular point containing one or more aphorisms. On any particular issue, the reason for a doubt to arise, the prime facie view, its logical untenability, proper reasoning and final conclusion are enumerated. Besides, the utility and connection with other topics are also indicated. The underlying principle or maxim of each topic is called a *nyâya*. Hence, *Mîmâmsâ* contains 907 *nyâyas*, as there are so many sections. The *nyâyas* are mainly meant for vedic text, but some of them are also applicable to general situations.

A few examples of abstracted *Mîmâmsâ nyâyas*

Listed below are the abstractions of the discussions in few illustrative sections in *mîmâmsâ* which finally present an outcome which is language independent and is applicable to discourse analysis in general. These happen to be the possible situations of ambiguity or conflicts between segments of a discourse (inter and intra).

(1) We take a situation where we need to map words against expected functional roles. There can be three types of expectancies in a sentence pertaining to the object, accessories and the manner. We need to relate as many words as that are present against the proper expectancies. Here, we are concerned with proximity as well compatibility. In a typical case where we get different words to take on the same functional roles by proximity and compatibility criteria individually, we need a solution as to which of them has to have priority and under what conditions. Proximity requires the nearest words getting connected to the expectancies in order. Compatibility would allow us to forgo proximity, if necessary in such a case, we take compatibility

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as the stronger criterion to ensure meaningfulness rather than immediate cognition. This has to be ensured for all the words of the sentence.

(1-a) For a given word to function as an objective it should be in the form of happineess (or a mental state). This is not the case with activities. Hence an activity cannot be an objective. Thus, the activity can only be an accessory.

(2) In cases where words could denote names as well as certain qualities or attributes, we need a principle to decide which of them is to be taken. It may also be possible to posit multiple denotations for words. In such cases, we assign multiple functional roles simultaneously if they are compatible. The factors involved in this compatibility check are the consideration of the attributes of the concerned word in terms of the dual triplets i.e., being intended, being cited and primary as the first triplet and being performed, being directed and secondary nature as the second triplet. Sentence splitting also has to be avoided.

(3) In situations where a subset of sentences (discourse segment) denotes attributes different from the main set (discourse) then we assign certain special relationships (typically substrate) which will ensure that the main objective or accessories are given prominence while still connecting the current sentence meaning in the discourse. These are conceptual relations which are guided by the analysis of the dual triplets and sentence splitting criteria applied to the words of the sentence. These sentences are describing the manner or paraphernelia required for the main function and hence do not have the ability to alter it.

(4) When attributes like number, gender, etc. are used in generic injunctions the fact whether these features are specifically or generally intended is to be decided based on whether it is the original direction or is a citation. If in a sentence an act and many of its subordinate qualities are directed, then if that act is not already directed by any other sentence, then

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since it is not known, its injunction is understood. But if it is already directed, then it is treated as being cited and the various qualities are taken as directed by different sentences. Similarly, in general, if a material or subordinate (quality) or act is already directed, then by its citation, other similar or dissimilar material, quality or act cannot be taken to be directed without split of sentences.

(5) In cases where multiple activities are present in sentences or single activity is related to many things by reference (pronominals etc.) to decide whether the individual acts or independent ones we apply the principal of sentence split. This requires that any material, quality, or act cannot have connection with many things without a sentence split.

(6) In the common applicability of direct statement, word meaning, syntactic connection, context, position and name, the weakness of the latter is by reason of the sense. Among the 6 factors for decision, the first, i.e. direct statement will prevail over others and when it is present others will not be considered. Similarly, the last factor, name, will always be affected in case any other factor is applicable. Now, there are totally 15 situations of conflicts between these factors possible. i.e., 1 Vs. the others = 5; 2 Vs. the others = 4; and so on. Of these, the first 5 and the last 1 are of fixed priority as stated above. So, the relative priority we have to apply gets decided dynamically.

A detailed explanation of the hierarchy of knowledge sources is presented in the chapter on explanation.

(7) Though in a discourse all the words of different sentences must denote the objective in tune with the main function, they need not directly do so. There can also be elaboration of the different stages involved in accomplishing the main objective through subsidiary acts. These can have their own objects. For the discourse coherence, an abstract entity called अपूर्व *(apûrva)* is proposed which takes up the key objective or function of each segment of the discourse and provides the link to the main objective.

(8) The key function in a sentence is the productive urge denoted by the verbal suffix. This is precisely in the form of a mental resolve (intention)

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to achieve the main objective through the current subsidiary act and includes the effort taken to realize it. The main objective thus gets qualified by the segment objectives. Thus the principal objective can be linked to the intention to produce the various verbal meaning (activity).

(9) In a specific discourse with a defined objective further sentences describing the details of the topic need not fulfill all the three required expectencies (regarding objective accessories and the manner) individually. Thus an incomplete sentence also can be linked up using the known factors inherited from earlier sentences. An analysis of the derivational process for meanings of the words and the sentence can also be restored to supply the missing factor i.e. the unfulfilled expectancy. In other words, we can complete the sense of the sentence from the information in the other sentences.

(10) In sentences where an injunction is related to an agent with a particular desire the objective can only be the object of desire. Here the activity required to obtain the object is necessarily an instrument. This is based on the maxim that only happiness or one leading to it can be the objective. If in the company of such activities, we find words in the instrumental case i.e. other candidates for instrument, these are preferred as names of the activities denoted by the verbs. We need not assign other function status like an attribute or accessory to these words with respect to the verbal meanings.

This case arises because adjectives have to syntactically agree with the qualified entity in terms of gender, case and number. The point to note is any expectancy is sought to be satisfied by the words present closest to it and once a suitable candidate is found, expectancy gets satisfied. Further, even if other candidates exist (but at a distance), they are not considered for the functional role, as the vacancy is already filled. This implies that in the case of non-functor relations (adjectives, subtantives etc.) the word order is given prominence by the principle of proximity.

(11) When the question of the sequence in which a set of subordinate sentences are to be related to the principle sentence arises, the approach

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followed is for a given objective all sentences which contain details regarding accessory or manner offer themselves simultaneously for consideration. The result of the expectancy analysis from each of such sentences is summed up and linked to the main objective. There could be different sub-objectives in these sentences.

This is likened to a situation where a group of birds flying over a grain pounding field descending simultaneously on to the grains irrespective of their seniority (young, old etc) as their common interest is to get food which is independent in each of them. Similarly sub-ordinate sentences capable of satisfying the same expectancy in the principal sentence are not mutually subordinate i.e., they all have equal priority.

(12) Guidenline for determining the meaning of words is based on the denotative power of words understood through the process of base-suffix analysis and the conceptual category of the object that can be denoted. If such a primary meaning is inadmissible in some situation due to strong reasons like a direct statement only then we take recourse to secondary meanings in which the object denoted has a direct or an indirect relation with the primary meaning. Thus in cases where a word occurs for the first time (that is an unknown word) then we prefer it to be a proper noun if acceptable. A diluted sense taken in a particular sentence is treated as a local phenomenon i.e. it is not carried through to the rest of the sentences in a discourse. We begin with taking a primary meaning in each of the subsequent sentences.

(13) Word-meaning relationships are closely scrutinized to come up with three possible alternatives, viz. Words denote only particular forms (shape) or particular form with genus and only genus. Here, due to quick recognition, potency of words is taken in genus only and particular form is got by expectancy. This principle when applied to words means that words denote generic classes (conceptual categories) and the particulars are established by expectancy.

(14) Another principle applied in cases of determining word-senses is the division of denotative or conventional process of the meaning derivation.

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With conventional words no analysis is needed to come up with the meaning denoted while in the denotative meanings derivational analysis is the basis. While convention restricts the absolute potential of the word to denote meaning it has the advantage of generating immediate cognition.

(15) If in a Vedic situation we find any injunction without an express mention of an objective, then we assume this to be the ultimate objective possible i.e. heaven. The principle here is that no unnecessary word is used in serious and meaningful discourses and that every word used contributes uniquely to the total sense. Then gaps are to be filled by the most suitable items from the same conceptual categories. This also implies that if any constraint is not expressed then it is not assumed, ie., the absolute is taken.

(16) In the above context (15) implicit indications or suggestions contained in the same discourse (typically as a sub-goal etc.) can be alternatively taken as the objective. This can also be found in the illustrative or laudatory parts even. However, a compatibility check is necessary here.

(17) In cases where specific details regarding the manner of activities etc. are not available implicitly or explicitly, then we take recourse to prevalent practice by tradition. Here the basis is that the tradition has a Vedic text as its basis which now is not known or available.

(18) Whenever certain extra information other than what is expressly stated is assumed, then such assumptions are to be local to the concerned sentence or segment level only. Typically while dissolving compound words, the possible alternatives are evaluated on the basis of minimum effect on expressly stated information. This is specifically relevant where different types of compounding or sub-types of a same compound are applicable. This is based on the fact that in case of compound words, the emphasis could be on the first, last, all, or an external object (technically none).

Some adapted *Mîmâmsa nyâyas*

The universal nature of the generic principles of extended sentence and discourse analysis dealt with in *mîmâmsa* is amply clear from the numerous

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maxims applicable in classical language situations and domains like jurisprudence, behavioural sciences, etc. These are popularly known as **लौकिकन्याय** *(laukikanyâya)*. A few examples are discussed below.

प्रधानमल्लनिबर्हणन्यायः *(pradhânamallanibarhaṇa nyâyah)*

The Maxim of vanquishing the main wrestler implying the futility of the need to tackle the rest of his men. This occurs while discussing the various sources of knowledge about *Dharma*. Since direct sensory perception itself is incapable of enlightening us about *dharma*, there is no question of others like inference etc. which depend on direct sensory perception for their operation, enlightening us about it.

पूर्वोधावतिन्यायः *(pûrvodhâvati nyâyah)*

The maxim of the 'the first fellow runs' says that if a sentence said 'the first runs' it should only be meant that there exists at least one more (a second) person but not for deciding what he is doing (i.e., it does not imply that the second person is also running). This is used in support of prime facie view in holding that number associated with a word form denotes only the quantity and not any other attribute.

गार्हपत्यन्यायः *(gârhapatya nyâyah)*

In sense determination of words, the connotational sense could be overridden by derivational or etymological (denotational) sense in case of express scriptural statement. This fixes a sort of criterion for sense determination in case of ambiguity or doubt.

सत्रन्यायः *(satra nyâyah)*

Substitution principle. Where a ritual has to be performed with a minimum of n (17) number of participants and if one of them dies, there has to be a substitute for him, but the substituting person is ineligible for the benefits of the ritual or sacrifice.

दर्विहोमन्यायः *(darvihoma nyâyah)*

Independence principle. Something that neither borrows or inherits anything from others, nor lends to other rituals is said to be self-reliant and independent.

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Theory of coherence in discourse

We consider the following question to propose a theoretical basis explaining relation between words and parts of the sentence to the total discourse.

Does the hearer understand the sentence being uttered, particularly in cases of extended/connected sentences, as he hears, i.e. gradually build up an understanding and, of course, apply changes as the incoming words are understood or does he wait for the end of communcation to be signalled, for beginning the process of understanding, so that there would be no need to apply subsequent correction, as a unique import can be made out ? This is the central issue for proposing sentence coherence theories. Evidently, this depends on the process by which isolated words in Sanskrit (though composite) denote their objects, i.e, meaning, this leads us to the following question :

Do the words in the sentence convey their meanings in isolation or as connected together ? There are two different views offered by the two schools of *mîmâmsa* regarding the function of the words in a sentence. According to one view, known as **अन्विताभिधानवादः** *(anvitâbbidhânavâdab)*, words convey their own senses not in isolation, but as connected together, in a sentence, no word gives by itself any clear meaning, but only as related to other. According to the other view, known as **अभिहितान्वयवादः** *(abbibitânvayavâdab)*, words primarily signify their own senses; but the meaning thus derived conveys the combined meaning of the sentence. We regard the first view as the sounder one. In other words, there is no need of apprehending each word separately before combining them in a sentence, when the meaning of the whole sentence can as well be conveyed at once as the collective sense of all the words, i.e, the potency lies in the process of coherence itself, if the three previously mentioned requisities are satisfied.

Words denoting known objects are collocated to denote an activity etc, in a sentence. There is no basis to establish a sentence meaning which is isolated from its constituent word meanings. That sentential meaning contains

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something different from word meanings is not even known or corroborated by inference. The words end after denoting their objects. The objects thus known give us the sentential meaning. When words denoting color like white, black, etc, are used, the respective colors are understood. To denote the object with that attribute, the word denoting attribute itself (as a qualifier) is sufficient (through the expectancy raised) and thus combined meanings (objects with their qualities) are denoted by qualifiers themselves. The combined meaning thus obtained is the sentential import.

Experience suggests a right combination of both the processes of incremental cognition/verification as well as a final confirmation. Thus, both the above theories have been found to have practical applications. With the aid of *kâraka* theory, however, the अन्विताभिधानवादः *(anvitâbhidhânavâdah)* is found convenient to apply in most cases. The details of the discussions, though availble, are avoided here.

Thus, we have briefly hinted at certain exciting material contained in *mîmâmsa* works, which, in our opinion, could be beneficial to NLP. We wish to evoke further discussions from the researchers in the field, particularly regarding our system, DESIKA.

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DEVELOPMENT OF SEMANTICS IN ANCIENT INDIA

A. Bharadwaj

Introduction

Language is the subject of study of the academic descipline known as Linguistics. We use the word language to refer to a limited stock of movements or utterences by which we communicate a limited number of messages. In doing so we recognise that we are speaking of something different in kind from our own language.

Lexicon

Lexicon is a book containing an alphabetical arrangement of the words in a language and their definition. Collection of words and word elements which we put together in various way to form larger units of discourse : Phrases, Clauses, Sentences form a lexicon. All languages have lexicons and all lexicons are governed by rules that permit some kinds of word formation, make others dubious and render still other clearly impossible. Grammatical system of language governs the way in which words are put together to form the larger units of discourse. Such units find an origin from the very Vedic texts. Semantics is the study of the way in which interpretation is explicitly attached to a formalized logistic system.

Brâhminical texts give the explanation for the *sambitas* and give the derivation of meaning Cf : उदानिषुर्महीरिति तस्मादुदकमुच्यते (अथ. वे. ३-१३-१) (*Udâniṣurmahîriti tasmâdudakamucyate - Atha. V.* 3-13-1). These were discussed in detail in *Yâska's Nighaṇṭu* and *Nirukta* whose ideas are taken from the *Sulba sûtras.* The evolution of these thoughts are traced in the following paragraphs.

In the days of yore *vedas* used to be imparted by oral tradition. Hence the meaning of the sentences and sequence of the words used to be preserved

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in a different mode of recitation called पद (*Pada*), क्रम (*Krama*), जटा (*Jaṭâ*) and घनपाठ (*Ghanapâṭha*).

क्रम – Repetition of the sequential combination of two words.

जटा – Repetition of the sequential combination of three words.

घन – Repetition of the sequential combination of three words and next words. (For examples of these modes see last page).

These modes may be regarded as playing the part of lexical functions. The sequence words were unchanged and the same meaning was preserved for future.

Evolution of Semantic thoughts in Vedic Lore

In Ancient India, though the study of the phenomenon of change in meaning did not develop as an independent field of study, yet the scholars were completely aware of the changing connotations of a word. Their observation on this aspect of linguistic change are found scattered in various kinds of treatises of grammar, etymology and philosophy.

In the extant vedic literature, *Yâska* is the first to refer to the change of meaning explicitly in his etymologies given in his work, the *Nirukta*. Hundreds of etymologies given in his work, represent an attempt to study the changing meaning of vedic words, which have undergone profound semantic changes in course of time. Sometimes he offers various derivations of a word for example he has noted 14 derivations for *Indra*, six for *Jâtavedas* and five for *Agni*. From this we can conclude that *Yâska* was fully aware of the important role which homonyms play in the field of semantic change.

Pânini's *Asṭâdhyâyî* takes note of different charecteristics of semantic change. The chapters dealing with नामधातु (*nâmadhâtu*), परस्मैपद (*parasmaipada*), आत्मनेपद (*Âtmanepada*) particularly reflect his awareness of polysemia, doublets and homonyms [Eg. *Sûtras* dealing with the formation of such words as वृषस्यति (*vrṣasyati*), लवणस्यति (*lavanasyati*), उदन्यति (*udanyati*), यवनाति (*yavanâti*), उत्तिष्ठते(*uttisṭhate*), व्यतिलुनीते (vyatilunîte), संयच्छते (*samyacchate*) etc.[1] *Patañjali*

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and *Bhartrhari* too show their acquaintence with the change of meaning in the form of restriction, expansion and transference. But the main concern of these grammarians was with the development of the philosophy of word and its meaning, which later on developed into a doctorine known as *sphotavâda*.

The philosophers and rhetoricians had already noticed the fact that the meaning of any linguistic form is the situation in respect to which it is used. Their observations regarding the powers of meaning viz., अभिधा (*abhidhâ*), लक्षणा (*lakṣaṇâ*), व्यंजना (*vyañjanâ*) and their listing the determining factors of meaning such as association, opposition, purpose, context etc., indicate their depth of understanding in this subject.

The rhetoricians grappled with the problem of meaning in another field also. Analysing the figures of speech (*alaṅkâras*) which infact are various devices to impart a heightened touch to one's expression they discuss different shades of meaning.

The *Taittirîya Brâhmaṇa* studied in the light of the semantic changes discussed in the foregoing paragraphs open up a new vista of an interesting investigation. A number of words from the *Taittirîya Brâhmaṇa* are listed below whose meaning deserve a closer study from semantic point of view.

Restriction of meaning

1. अर्क (*Arka*) – Derived from the अर्क (*Arka*) - praise. '*Arka*' originally denoted the invoked or that which is praised.

अर्को देवो भवति, यदेनमर्चन्ति ।
अर्को मन्त्रो भवति, यदनेनार्चन्ति ।
(*Arko devo bhavati, yadenamarcanti*
Arko mantro bhavati, yadanenârcanti – Nirukta V-4)

Then it became restricted in denoting only the sun. The original meaning is presented in a reference in *Taittirîya Brâhmaṇa* इन्द्रमर्केभिरर्किणः (१-५-८-२) (*Indramarkebhirarkiṇah* – 1-5-8-2) The praisers (the gathins) praise *Indra* with enlogies. In another reference अर्क (*Arka*) is said to denote the fire cf : प्राणापानौ

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वा एतौ देवानां यदर्काश्वमेधौ (३-९-२१-३) (*Prâṇâpânau vâ etau devânâm yadarkâśvamedhau* – 3-9-21-3). The Fire and Sun are *Prâṇa* and *Apâna* of the Gods. *Sâyana* quoted another Brâhmaṇa to support this identification अर्कोवा एषः। यदग्निरसावादित्योऽश्वमेधः। (*Arkovâ eṣaḥ. Yadagnirasâvâdityo'śvamedhaḥ).*

2. आपः and सलिलम् (*Âpah* and *salilam*), both synonyms for water, have been used together twice in *Taittirîya Brâhmaṇa.*

अपोवा इदमग्रे सलिलमासीत् (१-१-३-५)
तद्वा इदमापः सलिलमासीत् (२-२-९-३)
(*Apovâ idamagre salilamâsît* – 1-1-3-5)
(*Tadvâ idamâpah salilamâsît* – 2-2-9-3)

The context in both the references relates to the origination of the universe. The pronoun इदम् (*idam*) here indicates 'this world'. The word सलिल (*salila*) here is used as an adjective meaning moving derived from root *Sr.* or following *Sâyana* root *Sal.* So the sentences given above may be rendered as this world then was in the form of flowing waters अप्रकेतं सलिलं सर्वमा इदम् (*apraketam salilam sarvamâ idam*) R.V – X.129-3.

The word *Âpah* is also used in conjunction with *payas* denoting both water and milk while used with आपः (*âpaḥ*) *payas* is restricted in the sense of milk आपः पयसा सम्बभूवुः – 'The waters which co-existed with the milk'. Sanskrit rhetoricians have recognised that in such cases the proximity of another word determines the meaning of a word i.e., restricts the meaning [the factor is called अन्यशब्दसन्निधि (*Anyaśabdasannidhi*)].

Generalization of a meaning

The general tendency of a language is to be more and more adequate, specific and exact. Hence the tendency is to restrict or contract the meaning of a much used word. But in some cases on account of metaphor or analogy the widening of meaning of a word takes place in course of time. Some causes for extension of meaning is illustrated with examples from *Taittirîya Brâhmaṇa.*

(A) Frequent vague use of certain terms gives them a vide scope of usage.

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1. उपांशु (*upâmśu*) The adverbial use of उपांशु (*upâmśu*) expresses silently, secretly etc. उपांशु प्रचरति (१-३-१-५) 'He moves silently'. Some opine that this sense has developed from *amsu* 'Part, stem (of *Soma*). The adverbial meaning developed from compound words like उपांशुसवन (*upâmśu savana*) which gradually expressed small vessel of *'soma juice'* and the secondary pressing of the *soma* respectively. The sense of small, secondary in course of time changed to be silently, secretly for the independent उपांशु (*upâmśu*). In *Taittirîya Brâhmaṇa* itself उपांशु (*upâmśu*) independent from उपांशुग्रह (*upâmśugraha*) is used.

cf : एषा वै सोमस्याहुतिः यदुपांशुः (१-४-१-२)
(*Eṣâ vai somasyâhutiḥ yadupâmśuḥ* - 1-4-1-2)
This small vessel (of *soma*) is indeed the oblation for *Soma*.

(B) Sometimes the meaning is transferred to denote allied objects,

1. अद्रि – mountain is used to denote the earth with mountains in a *mantra*. इन्द्रो दीर्घाय चक्षसे। आसूर्यं रोहयद्दिवि। विगोभिरद्रिमैरयत्(१-५-८-२) – (*Indro dîrghâya caksase. Âsûryam rohayaddivi. Vigobhiradrimairayat* – 1-5-8-2).

Indra made the Sun mount the heaven. In order to have a better vision. Thus he illuminated the earth with the rays.

2. इन्द्र – *Indra* is called to be the supreme among the Gods in the veda similarly the leader among men is also called *Indra*.

एकैको वै जनतायमिन्द्रः। (१-४-६-१) *Ekaikovai janatâyamindraḥ* – There is a leader in each group of the people.

इन्द्रिय the derivative of *Indra* also depicts the extension of meaning. The following series of semantic change is expressed by *indriya* - belonging to *Indra*, the powerful, power, semen, penis and sense organ.

इन्द्रियं वै सोमपीथः। तेनेन्द्रियेण द्वितीयां जायामभ्यश्नुते। १-३)
इन्द्रियं वै त्रिष्टुप् इन्द्रियमेव यजमाने दधाति। (३-३-९-६)
इन्द्रस्य सुषुवाणस्य दशधेन्द्रियं वीर्यं परापतत् । (१-८-५-१)

(*Indriyam vai somapîthaḥ. Tenendriyena dvitîyâm jâyâmabhyasnute*. 1-3)
(*Indriyam vai tristup indriyameva yajamâne dadhâti*.3-3-9-6)
(*Indrasya suṣuvânasya daśadhendriyam vîryam parâpatat*.1-8-5-1)

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Other Transferences of meaning

Values of life are in a constant state of flux and change. This affects the meaning of a word in numerous ways. The meaning may transfer between the cause and the effect, the part and the whole, the place and its products or inhabitants, the good and the bad or between two allied ideas.

A study of *Taittirîya Brâhmana* offers many examples to illustrate different varieties of transference of the meaning. Following are different types of such semantic change and their illustration from *Taittirîya Brâhmana.*

(A) **Pejoration:** Subject to the view of the speakers a language, the meanings like other temporal objects, display a tendency towards deterioration. This tendency is known as pejoration in semantics.

1. अवर्ति (*avarti*) - वर्ति (*varti*) - *Vrt* - to be, Subsist. Singnifies being, livelyhood. Its negative compound form '*avarti*' denotes a hard painful living.

cf. अवर्तिं पाप्मानं मृत्युमुपजघ्निरे। (१-५-९-६)

– They ended the death-like sorrowful living.

2. पुरीष (*purîṣa*) In the context of piling of *Naciketa* fire पुरीष is used to express soil or loose earth.

cf. पुरीषमुपधाय। (३-११-९-९) (*Purîṣamupadhâya* – *3-11-9-9*)

– Later on the word is understood in the sense of faeces.

cf. गोश्चपुरीषे (*Goścapurîṣe*)

(B) **Amelioration:** In some cases, the process opposite to pejoration takes place. The phenomenon of upgradation or improvement in the meaning of a word is called 'amelioration'. An example is given below.

विष्टप (*Viṣṭapa)* indicates the hump of a bull and by analogy a high place. For example

ऋषभो वा एष ऋतूनां। यत्संवत्सरः । तस्य त्रयोदशो मासो विष्टपम् । (३-८-३-३)

The year is like a bull among the seasons and its intercalary month is the hump.

Later on the secondary meaning 'The world' - only prevailed. In this sense too *viṣṭapa* is used in *Taittirîya Brâhmaṇa*.

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तद् ब्रध्नस्य विष्टपम्। (३-६-१०-३) – 'That is the world of the sun'.

(C) The transference of meaning displays a greater tendency towards abstraction than concretion. Analogy and metaphor play a considerable role in bringing out such a change of meaning.

जामि *Jâmi* — In the Brâhmanas *Jâmi* used in the ritual contexts, mostly indicates duplication or repitition. This abstact sense has developed from another meaning of the word indicating a family relationship. Originally *Jâmi* signified a woman belonging to the non marriagiable group or kinship with the class in the exogamous system prevalent in Aryan society. Social significance is brought out in the following mantra.

cf. बहु, वै राजन्योऽनृतं करोति। उपजाग्यै हरते। जिनाति ब्राह्मणम्। वदन्त्वनृतम्। (१-७-२-६) Misdeeds of *kṣatriyas* are many. He presents gifts to an unapproachable women (i.e., he transgresses the rules of matrimony) vanquishes *brâhmaṇa* and speaks untruth.

आशायै जामि प्रतीक्षायै कुमारीम् ३-४-१९-१ He offers *Jâmi* (a woman) to *Âśâ* (Deity of hope) & *Kumârî* - maiden to प्रतीक्षा *Pratîkṣâ* (Deity of expectation).

सजातशंसादुत वा जामिशंसात् (३-७-१२-२)

(Sajâtasámsâduta vâ jâmiśamsât – 3-7-12-2) — Save me from sin arising from laudations done by relatives of women of the same group.

(D) **Concretion** – The word of quality becomes name of an object.

सुवर्ण – *Suvarṇa* is used as an attributive (One with fine colour) तद् दुर्वर्णं हिरण्यमभवत् ... ... तत् सुवर्णं हिरण्यमभवत् (२-२-४-५) - That became the bad coloured metal and that one with a fine colour . Later on '*Suvarṇa*' became prevalent as the name of one metal i.e. gold. This reference also shows the restriction of meaning of the word *Hiraṇya.* Formerly it was a common name for a metal then the sense was restricted to denote gold only.

Semantic concepts in a language are bound to lead to confusions unless some one first undertakes the thankless task of reforming the language. This

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reform would make it necessary to define the structure of the language very accurately. An attempt towards this is depicted by *Yâska's Nighanṭu, Śrautasûtras* and *Amarakośa* presently.

Yâska's Nighanṭu

Nighanṭu is a collection of vedic words intended mainly for interpreting vedic texts. *Nirukta* of *Yâska* is older than *Pâṇini* (4th Century B.C.) This is the ancestor of later lexicographical works. *Nighanṭu* contained nominal forms and also verbal ones. Later *Kośas* restricted themselves to nominal forms and indeclinables. The Sanskrit *Kośas* were composed in verse so that they could be commited to memory easily. *Yâska* was able to arrive at the meanings as restored in the *pada* and *krama pâṭha* of the *Samhitas*. Brâhmanical texts clearly mention the transmission of meanings. The *Âraṇyakas* contain self explanatory *mantras. (see tables)*

All these ideas are put together and words are divided in three categories viz., synonyms, homonyms and names of *devatas*. Totally *Nighanṭu* enlists 1773 words. He refers to the words of the first three chapters as *Naighanṭuka*, of fourth chapter as *Naiganṭuka Naigamika*, of fifth chapter as *daivata*. *Nirukta* is the commentary of *Nighaṭu* where the words find an explanation.

Amarakośa

नामलिङ्गानुशासन (*Nâmaliṅgânuśâsana*) of अमरसिंह (*Amarasimha*) is an authoritative ancient lexicon in Sanskrit Language. It is considered to be an essential requisite of a Sanskrit scholar. As this is in the verse form, it is commited to memory easily. *Amarasimha* is assigned to 4th century A.D. He was one of the nine gems in the court of *Vikramaditya*. *Amarasimha* robbed all the authoritative interpretations of *Patanjali's* महाभाष्य (*mahâbhâṣya*) as said by the adage अमरसिंहो हि पापीयान् सर्वं भाष्यमचूचुरत् । (*Amarasimho hi pâpîyân sarvam bhâsyamacûcurat*) This work was translated to Chineese by *Guṇarâta* and dictionares of other languages were influenced by this. He is the first to make an attempt to arrange the words topic-wise in *sargas*. The speciality of *Amarasimha* was the fact that he denotes both the nominal form and genders. Other *Kosas* of व्याडि (*Vyadi*) deals only with gender of words and उत्पलिनी (*Utpalini*) deals with the nominal forms only. It is such a faultless work as will last as long as the moon and the stars shine in the sky.

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cf. कवेरमरसिंहस्य कृतिरेषासुनिर्मला। आचन्द्रतारकं स्थेयान्नामलिङ्गानुशासनम् ॥

(Kaveramarasimhasya kṛtireṣâsunirmalâ. âcandratârakam stheyânnamalingânuśâsanam.)

It is an earliest attempt to construct a systematic arrangement of ideas with a view to their expression. Division of three *kâṇdas* namely 1) स्वरादि – *swarâdi*, 2) भूम्यादि - *bhûmyâdi* and 3) सामान्य - *sâmânya.*

If, man by speaking to others, has created a society outside him, he has by speaking to himself created 'thinking' with in him. Man's greatest gift to man is language, and language's great gift to man is 'thinking'.

(Text provided by the author)

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DIFFERENCE BETWEEN *ANVITÂBHIDHÂNAVÂDA* AND *ABHIHITÂNVAYAVÂDA*

D. Prahaladachar

Translated by **H. V. Nagaraja Rao**

Among all the means for grasping the power (of conveying the meaning) of words, usage is the most prominent. It is true that the power of words is sometimes grasped by studying a dictionary or grammar, or even through some other valid means of knowledge, but we see many ordinary people in the world who have no access to dictionaries or grammar; they could not have grasped the power of words through those books. But they also use the language and communicate. So, *vyavahâra* (or use of words in practice) is the main means of grasping the power of words. That is why the authors of systems of knowledge (*śâstrakâras*) recognise the importance of *vyavahâra* in the process of grasping the power of words which is called *śaktigraha*. Seeing how children behave vis-a-vis the use of language, we may have to imagine how the children develop their knowledge of the words. Or our own experience can be a guide. Even experience cannot be accepted as authoritative always. When grown-up persons learn and master a language, it may be possible to think how the *śaktigraha* is born in their minds.

So it may be said that *śaktigraha* is produced by observing the actual use of words by others. Such use does not involve merely individual words. It is always a cluster of words where the syntactic relation of the words is understood on account of their being pronounced together. So it may be reasonably said that *śaktigraha* occurs in words already having syntactical relations. This stand is upheld by *anvitâbhidhânavâdins*. *Abhihitânvayavâdins* object and say thus: the rule that *śaktigraha* takes place in syntactically

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connected words is not acceptable, because the power of say the word 'cow' is in cowness only .

Here one has to decide whether *śakti* (conveying power) has to be accepted in everything that is denoted by a word or not. Whatever is conveyed by the words has to be accepted as the constituent of the knowledge produced by the use of that word, which is called *śâbdabodha*. If *śakti* is not accepted in syntactically connected meanings, then the syntactical relation will not be considered as *śâbda* (that which is the result of the use of words). So, in order to hold the position (that syntactical relation is grasped through words) one should accept that *śakti* is in syntactically connected words. This argument is presented by *anvitâbhidhânavâdins*. There is another objection raised, with the question in the sentence *gâm ânaya* (bring the cow), where does the *śakti* of the word *gam* (cow) occur ?

The *śakti* of the word is in an object syntactically connected with the meaning of a verb [it is *ânayana* (bringing) here]. Similarly the word *ânaya* (bring) also has its power in conveying 'bringing' connected with cow. On the one hand, one will have to admit that the use of the word *ânaya* is useless because *gâm* itself can convey the meaning fully i.e., "cow connected with bringing". On the other hand, the use of the word *gâm* in the sentence is useless because the word *ânaya* itself can convey the full meaning i.e., "bringing connected with the cow". So, in *anvitâbhidhânavâda*, use of two or more words will have to be declared useless, because one word can convey the whole meaning of a sentence.

The *Prâbhâkaras*, who uphold the *anvitâbhidhânavâda* answer like this — It is true that the words always convey syntactically connected meanings. But, such relation is only with a thing in the general form and not in its particular form. So, when the word *gâm* is pronounced, the cow connected with some action is conveyed. But, to know which particular action is intended, it is necessary to use the word *ânaya* also. So, there is nothing wrong in accepting the *śakti* of words in syntactically connected meanings.

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Another objection is raised here. In the phrase - cow connected with some action - action falls in the adjectival position. Knowledge of a qualified thing is not possible without the knowledge of that qualification. So, unless the word *ânaya* (bring) is pronounced, it is not possible to know the meaning of the word *gâm*. Similarly the meaning of *ânaya* cannot be understood without the knowledge of the meaning of the word *gâm*. Thus, this becomes a case of mutual dependence, which is a flaw logically.

This objection is rejected on the ground that the knowledge of the qualifier and the qualified, though obtained independently, are connected together on account of pronouncing those words together. When these two views viz., *abhibitânvayavâda* and *anvitâbhidhânavâda* are comparatively studied, the latter appears to be more reasonable. The *visistâdvaitins* i.e., the followers of the Ramanuja school, also subscribe to this view.

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RELATION OF THE MEANINGS OF WORDS

Umakanta Bhatta

Abridged and translated by **H.V.Nagaraja Rao**

I. An introduction to the verbal experience

Śâbdabodha is an experience which occurs in a person having the knowledge of a verbal expression through the knowledge of the meanings of the words constituting the verbal expression, which is in turn produced with the help of the knowledge of the words' function. To give an example when a person hears the sentence 'The pot is black' there is born in his mind an experience which may be described as 'The thing called pot is not different from the black thing in this situation'. For this, the person should have the knowledge of the words 'black' and 'pot' and also their meanings. Such a mental experience is called by terms like *śâbdabodha, anvayabodha, vâkyârthabodha* etc., by adepts in the Śâstras. In *śâbdabodha,* the things like the pot etc., flash in the mind when the words are heard according to the rule which says that the knowledge of X brings to mind Y, if X and Y are known to be related. But the knowledge born of hearing the words of a sentence differs from mere remembrance because, in the former, the relation of two or more meanings also flashes in the mind due to their being uttered together. It also differs from perception because in it (perception), the things and their relation come to be known freshly. In inference only the relation appears freshly, and that too on account of the material consisting of the knowledge of concomitance.

II. Expectation and its role in *śâbdabodha*

The syntactical relation of the meanings of the words is called *anvaya* or *samsarga.* It is not the meaning of any word in the sentence. Still it forms a part of the *sâbdabodha;* The reason for that is *âkâṅkṣâ* or expectation. *Gadâdhara,* the great logician has stated this as follows:

"In *śâbdabodha,* the relation of the meaning of a word with that of another in that sentence flashes (in the mind of the hearer) due to expectation

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(*samsargamaryâdayâ*)." *Samsargamaryâdâ* means that which controls the knowledge of the syntactical relation. It is expectation only. One word is said to have *âkânkṣâ* with the other when the meaning of one does not produce the intended *śâbdabodha* in the mind of the hearer, without the other word. Such *âkânkṣâ* or expectation occurs in Sanskrit (and such inflected languages) between a word and its suffix. For instance, we may take the relation of *ghaṭa* + *am* in the accusative case. If the suffix *am* is not pronounced, the *karmatva* (objectness) of *ghaṭa* cannot be expressed. Similarly, two nouns have to be uttered in the same case in order to express the identity of their meanings. Such expectation of one word for another is called *âkânkṣâ*.

The relation conveyed by *âkankṣâ* in *śâbdabodha* is sometimes *abheda* (identity or non-difference) and sometimes *âdhârâdheyabhâva* (the relation of the supporter and the supported) etc.

III. Introduction to the rule of construing a meaning of word with the meaning of another word.

When the relation of the meaning of a word has to be connected with the meaning of another word in the sentence, the rule which states that the meaning should be construed with another whole meaning and not with a part thereof is to be accepted. Such a rule, stating the relationship of the cause and effect, is called *vyutapatti*. Even though the *vyutpatti* has different meanings in different contexts, here it should be taken only to mean *kâryakâraṇabhâva*.

IV. Explanation

The meaning of this rule is as follows: - "The final qualified portion of the meaning supplied by a word has to be constructed with the final qualified portion of the meaning of another word". In the example - *śuklaḥ paṭaḥ* - the word *śuklaḥ* conveys a thing possessing whiteness and the word *paṭaḥ* conveys a thing possessing clothness. These two meanings are construed to get the whole meaning viz., the thing possessing whiteness and that possessing clothness is one and the same. The meaning of the first word 'whiteness' should not and cannot be construed with a part thereof, viz., clothness.

V. What is the purpose of this rule ?

The main purpose of this rule is to avoid usages like *'nityo ghaṭaḥ'*. Such a possibility occurs if the above-cited rule is not accepted because *ghaṭatva*

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(potness) is eternal. If the meaning of one word (*nitya*-eternal) is allowed to be construed with a part of the meaning of another word, then *nityo ghaṭaḥ* would be a right expression because *ghaṭatva* is truly an eternal thing because it is a genus. But such usages are not at all accepted in standard language. Hence, the rule must be accepted. When such a rule is accepted, the meaning of the sentence *nityo ghaṭaḥ* will be only that the pot is eternal. Since a pot that has many constituents can not be eternal, the meaning is incompatible with actuality and hence such sentences are avoided.

It may also be noted that this rule excludes the possibility of sentences like *dîrghaḥ paśuḥ* (the cow is long) when the speaker intends to state that the hairs of the cow are long. In the absence of the rule, one may say that the meaning of the word *dîrgha* is construed with a part of the meaning of the other word, i.e. the hair of the cow. Therefore it is absolutely necessary to accept this rule.

VI. Delimitation of this rule

In some sentences which are accepted in standard language there arises a problem. For instance, we have *'sampanno vrîhiḥ'* where actually numerous paddy plants are intended to be described as ripe. In such cases, the above-cited rule does not apply. Similarly, in sentences or phrases like *caitrasya gurukulam,* this rule does not apply. In such cases, *caitrasya* is construed with a part of the compound word, and the meaning is understood as the residence of the teacher of *caitra*. Such cases are accepted because the relation is concomitantly expected there. Similarly in usages of secondary denotation (*lakṣana*), the rule may not be applicable.

It may be concluded that the meaning of a word should not be construed with a part of the meaning of another word keeping identity as their relation, but it may be construed like that if the relation is other than identity.

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AN OBJECT BASED KNOWLEDGE REPRESENTATION AND DATABASE SCHEMA DEFINITION METHODOLOGY FOR INDIAN LANGUAGES

C. S. R. Prabhu

Indian languages primarily being evolved descendants of Sanskrit, share common structure, vocabulary, conjugate forms and roots which are based on and are subsets of their equivalents in Sanskrit. The root-suffix analysis approach propounded by Sanskrit grammarian *Pânini* (7th Century B.C.) permits generation of conjugate forms from the roots of nouns and verbs using the appropriate suffixes. By reversing the same it is possible to perform recognition of roots and the corresponding suffixes from the final conjugate forms. Hence by performing root-suffix analysis, it is possible to identify the objects represented by the roots in a Natural (Indian) language sentence and the object attributes from the suffixes thereby identifying the knowledge content in the sentence. Algorithms were developed for performing the root-suffix analysis on select Indian languages (Telugu and Hindi) in addition to Sanskrit and implemented in C. Many schemes for representing the knowledge content of the sentence were studied. In this paper, a frame based schema to represent the knowledge in the sentence is proposed.

The knowledge representation methodology so defined can be easily extended for an object oriented database schema definition. The database schema so defined can be effectively queried by (restricted) Natural language sentences. Both the schema definition and query being in Natural language, the benefits to user, consequential to users familiarity with Natural Languages concerned (e.g. Hindi and Telugu), are substantial.

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Introduction

Natural language is widely recognised as an abstraction that is the closest to human comprehension of the knowledge of the real world. But it is extremely difficult to use a Natural language as a tool for knowledge representation due to the known problems as context sensitivity and ambiguity. Root-suffix analysis approach to a restricted subset of Indian natural language could, on the other hand, help to identify the knowledge contents represented by a simple sentence. By maintaining common Sanskrit roots for all noun and verb conjugate forms across the (otherwise) diverse Indian languages, it will be possible to achieve standardisation of roots and their usage. Since different languages maintain different sets of suffixes for the standard conjugate forms and the standard roots it is possible to generate and also recognise the noun and verb conjugate forms arising out of the standard roots and suffixes. In Section I, we discuss in brief root-suffix analysis, Section II the knowledge contents of a simple Indian language sentence as derived by the root suffix analysis, Section III a frame based representation scheme for representing the knowledge content of the sentence. Section IV deals with a new approach to object oriented database schema representation as an extension to the knowledge representation framework defined. User interactions in terms of queries in Natural language are also described. Section V deals with possible future work in this direction.

Section - I

Root-suffix analysis of conjugate forms of nouns and verbs in a language would identify the root which indicates the meaning (as per the dictionary) and the suffix which identifies attributes such as gender, case, number, tense etc. associated with the root. This process is referred to as 'recognition' while the reverse process which generates the conjugate forms is known as 'generation'.

Panini's grammar for Sanskrit language gives strict and formal rules which can be encoded as string operation algorithms for generation of conjugate forms starting from the roots and suffixes. Using these rules algorithms were developed to perform the root-suffix analysis. Other Indian languages

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like Telugu and Hindi, though have similar conjugate forms and sentence structures, have suffixes differing from those of Sanskrit. Hence these rules similar of Panini grammar were developed and root suffix analysis was taken up during the present work. Thus we could identify the objects and their attributes represented by simple Indian language sentences.

Section - II

Root-suffix analysis of words in a given sentence identifies the objects and their attributes in the sentence. These objects and their attributes when represented using a suitable representation scheme will convey the knowledge content of the sentence. Before going into the details of the representation scheme, we briefly discuss the knowledge contents to be represented.

The knowledge expressed by a simple sentence is considered as a single unit of knowledge. This assumption however doesn't affect the validity of the underlying discussion in more complex situations. The knowledge content expressed through a sentence consists of objects and the roles they play in the sentence. Objects in a sentence are of two types (a) Noun type and (b) Verb type (Other types such as prepositions and conjunctions are presently not considered owing to the subordinate, complementary role they play). Attributes and roles of objects depend on their type.

Depending on 'type' (t), an object has the following attributes as indicated.

I. If type t = n (i.e., noun object)

Then attributes of the objects are

i. Root
ii. Gender (g)
iii. Case (c)
iv. Ending character (e)

i. Root (Noun root) will be identified from the Noun-root dictionary.

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ii. Gender can have three values 1, 2, 3 for Male, Female and Neuter respectively.

iii. Number 'n' can have thre values 1, 2, 3 for singular, dual and plural respectively.

iv. Case 'c' has seven values as

1 = subjective case
2 = objective case
3 = associative : instrumental case
4 = cognate case
5 = derivative case
6 = possessive case
7 = containment case

v. Ending char can be any vowel or consonant in the language character set.

II. If type t = v (i.e., verb object)
then attributes of the object are
i. Root
ii. Tense 't'
iii. Number 'n'
iv. Person 'p'
v. Voice 'v'

i. Root (verb root) is identified from the verb root dictionary.

ii. Tense 't' can have ten values indicating all possible denotions of temporal nature and moods. They are

i. t = 1 (present tense)
ii. t = 2 (historic past tense)
iii. t = 3 (general past tense)
iv. t = 4 (today's past tense)

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v. t = 5 (general future tense)

vi. t = 6 (today's future tense)

vii. t = 7 (remote future tense)

viii. t = 8 (mood : order)

ix. t = 9 (mood : prayer)

x. t = 10 (mood : blessing)

iii. Number 'n' has values 1, 2, 3 for singular, dual and plural respectively.

iv. Person 'p' can have three values 1, 2, 3, for first, second and third persons respectively.

v. Voice 'v' can have two values 1,2 for active and passive voice respectively.

Knowledge can be represented by objects and their attributes defined above. But for the objects to represent valid knowledge, the sentence of which they are part has to be a valid sentence. The validity of a sentence is determined by the sentence semantics. The sentence semantics for a simple sentence in Indian languages are expressed in the form of rules as below.

i. There should be atleast one object of type t = n (noun and one object of type t = v (verb).

ii. The number and gender of object with type t = v (verb) should match with those of the object with type t = n (noun).

iii. If there are more than one object of type = n or v, there should be a matching object of type = v or n either independently or repeatedly.

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Section - III

In this section we present a frame representation developed by us to represent the objects and the knowledge conveyed by the simple sentences discussed in the previous section. A frame is a knowledge structure which can be defined as :

[FRAME < frame name >
< slot name > : (<facet > : < value>)]

with inheritance as a key feature. The INHERITS - FORM slot in a frame indicates the parent frame.

In any scheme for representing knowledge conveyed through Indian language sentences, representation of the noun and verb root dictionaries is an important factor. In addition sentence semantics are also represented to check the validity of sentence structures. The dictionaries and the sentence semantics are represented in two separate frame taxonomies as represented below.

```
[FRAME : Object
        {HAS-CHILDREN  :  (VALUE : (Noun, Verb))
                          (INHERITANCE : NO)}
]

[FRAME : Noun
        {INHERITS-FROM :  ( VALUE : Object)}
        {TYPE          :  (VALUE : n)}
]

[FRAME : Verb
        {INHERITS-FROM :  (VALUE : Object)}
        {TYPE          :  (VALUE : v)}
]
```

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```
[FRAME : Noun-root
        {INHERITS-FROM :   (VALUE : Noun)}
        {Gender        :   (VALUE : Noun)
                           (RANGE : Male, Female, Neutral)}
        {END-CHAR      :   (VALUE :        )
                           (RANGE : Alphabet)}
        {CASE          :   (VALUE :      )
                           (RANGE : 1. .7)}
        {NUMBER        :   (VALUE :    )
                           (RANGE : 1. .3)}
]

[FRAME : Verb-root
        {INHERITS-FROM :   (VALUE : Verb)}
        {TENSE         :   (VALUE :       )
                           (RANGE : 1. .10)}
        {NUMBER        :   (VALUE :       )
                       :   (RANGE : 1. .3)}
        {PERSON        :   (VALUE :       )
                           (RANGE : 1. .3)}
        {VOICE         :   (VALUE :       )
                           (RANGE : 1. .2)}
]
```

The above collection of frames represent the taxonomy of fig.1 representing the Noun and Verb root dictionaries. The frames "Rama" and "Patha" are examples of the many roots that are in the dictionaries and their frame representations are shown below :

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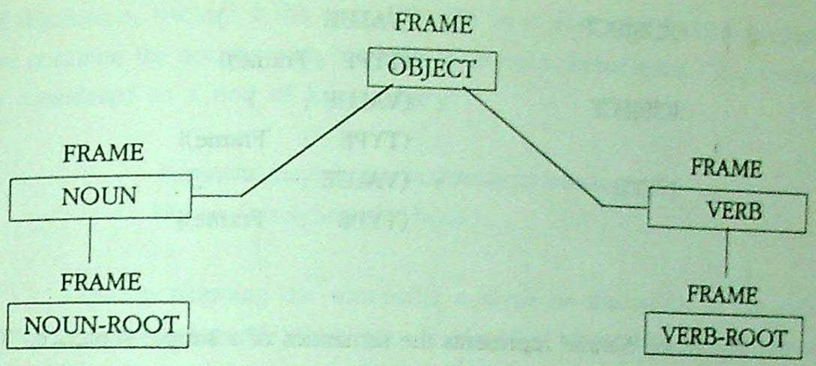

Fig.1 Taxonomy of Noun & Verb Root Dictonaries

[FRAME : Rama
  {INHERITS-FROM : (VALUE : Noun-root)}
  {GENDER : (VALUE : Male)}
]

[FRAME : Pustak
  {INHERITS-FROM : (VALUE : Noun-root)}
  {GENDER : (VALUE : Neutral)}
]

[FRAME : Patha
  {INHERITS-FROM : (VALUE : Verb-root)}

Sentence semantics are represented by a different frame taxonomy as represented by the following frame base.

[FRAME : Sentence
  {HAS-CHILDREN : (VALUE : (Simple.......))
  (INHERITANCE : NO)}
[FRAME : Simple
  {INHERITS-FROM : (VALUE : Sentence)}
  {IF-INSTANTIATED : (APPPLY : Rule-set - 1)}

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{SUBJECT : (VALUE :)
(TYPE : Frame)}
{OBJECT : (VALUE :)
(TYPE : Frame)}
{VERB : (VALUE :)
(TYPE : Frame)}

]

The frame 'Simple' represents the semantics of a simple sentence. The IF-INSTANTIATED slot has a facet APPLY which will require the firing of the rule set whenever an instance of the frame is created. The INHERITANCE facet of any slot indicates whether the slot can be inherited by the children frames. The taxonomy corresponding to the above frame base is shown in fig.2.

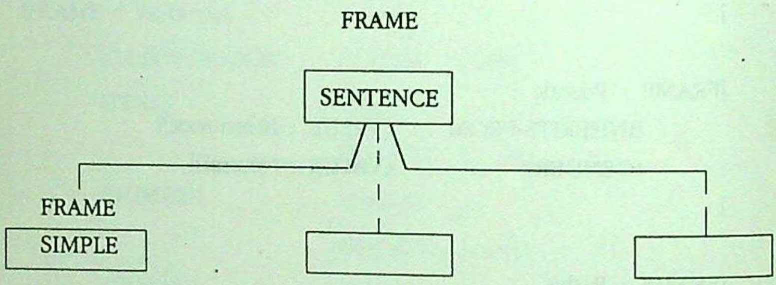

Fig.2 Taxonomy of Sentence Semantics

The taxonomies shown in Fig. 1 & 2 together represent the knowledge base (KB) which we call the system KB. This is because the two taxonomies represent knowledge of the language and are independent of the domain of discourse. The Object taxonomy is only two levels deep, but Sentence taxonomy can be much deeper depending on the sentence types under consideration.

Another KB is which is created by a user when he tries to convey knowledge to be represented via natural language. This for the convenience

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of discussion, we call it the user -KB. To be at ease with further discussion, we continue the section with the help of an example sentence. This sentence is considered as a unit of knowledge :

Ramudu pustakamu pathinchchunnadu
(Rama is reading the book)

Upon performing the root-suffix analysis on the words in the above sentence three independent objects are identified along with their attributes. Interacting with the system KB the following frames are created in the user KB.

```
[FRAME : Rama 1
        {INHERITS-FROM :   (VALUE : Rama)}
        {TYPE          :   (VALUE : Instantiation)}
        {LANGUAGE      :   (VALUE : Telugu)}
        {GENDER        :   (VALUE : Male)}
        {END-CHAR      :   (VALUE : 'a' )}
        {NUMBER        :   (VALUE : 2)}
        {CASE          :   (VALUE :      )}
]

[FRAME : Pustaki 1
        {INHERITS-FROM :   (VALUE : Pustak)}
        {TYPE          :   (VALUE : Instantiation)}
        {LANGUAGE      :   (VALUE : Telugu)}
        {GENDER        :   (VALUE : Neutral)}
        {END-CHAR      :   (VALUE : 'a')}
        {NUMBER        :   (VALUE : 2)}
        {CASE          :   (VALUE :      )}
]

[FRAME : Patha 1
        {INHERITS-FROM :   (VALUE : Patha)}
```


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```
        {TYPE              :   (VALUE : Instantiation)}
        {[LANGUAGE         :   (VALUE : Telugu)}
        {TENSE             :   (VALUE :        )}
        {PERSON            :   (VALUE : 3)}
        {NUMBER            :   (VALUE : 1)}
        {VOICE             :   (VALUE :        )}
    ]

    [FRAME : S 1
        {INHERITS-FROM :   (VALUE : Simple)}
        {SUBJECT           :   (VALUE : Rama 1)}
        {OBJECT            :   (VALUE : Pustak 1)}
        {VERB              :   (VALUE : Patha 1)}
    ]
```

These four frames represent the derivable forms of the roots used in the sentence. They inherit generic properties from the corresponding frames in the System KB. Rama 1 inherits from Rama, Pustak 1 from Pustak and Patha 1 from Patha. Thus the user KB after creating the frames is as shown in Fig. 3.

FRAME	FRAME	FRAME	FRAME
RAMA 1	PUSTAK 1	PATHA 1	S 1

Fig. 3 Frames in user KB after processing the example sentence.

However the system KB and user KB do not act as independent KBs when any application is run using them. But they together form an integrated KB which we call the working KB. The working KB when working with the Example user KB and the system KB is shown in Fig. 4. The relevant parts of the system KB are brought into the working KB by copying appropriate parts of the taxonomies. This facility is modeled on the copy facility available in the Frame language SRL. The taxonomies or frames of the user KB

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proceeds, appropriate parts of the taxonomies in the system KB can be brought into the working KB.

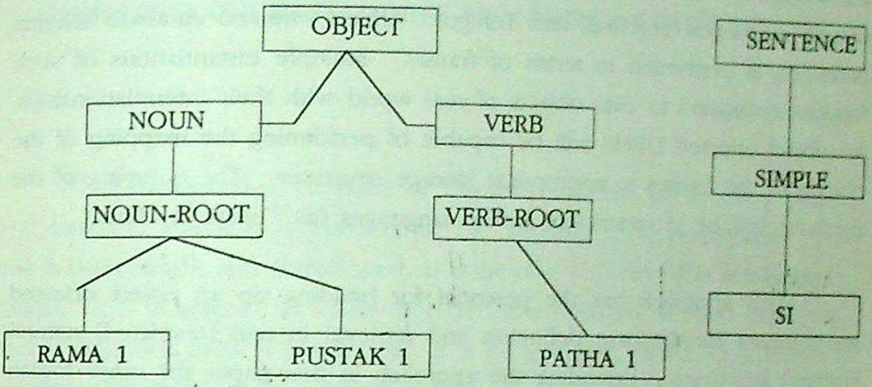

Fig. 4 Working KB after activating the system KB and relevant user KB

Section - IV

The above object based knowledge representation scheme can be extended for database definition. Subsequent querying of the database will be upon the schema so defined. The logical schema or the logical data model of a real world database can be represented as a knowledge base frame (as described previously). The mapping from the knowledge frame to real storage mechanisms for objects so identified can be achieved by appropriate storage and indexing structures (which can be the subject matter for a different paper outside the scope of the present paper). After the schema definition, data will be stored in the pattern of the knowledge frame for a given application of the real world in the form of storage structures. Queries can be asked on the schema by giving qualifying conditional clauses in (restricted) natural languages, and seeking to retrieve (target) data meeting the conditions. Both the (restricted) natural languages (specified Indian Languages to start with). The internal object based data definition and storage will however be language independent though interaction can be through multiple Indian languages. However, the issues involved of full fledged object oriented database schema definition and retrieval by queries are yet to be worked out.

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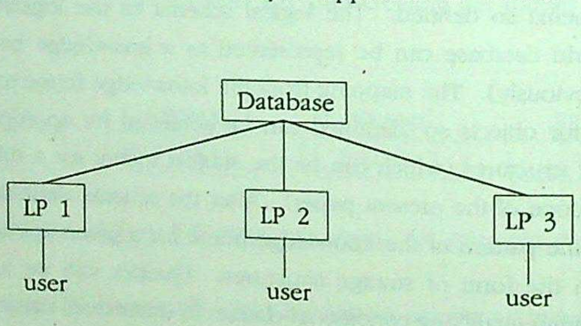
Section - V

In the above sections a basic framework is presented for object based knowledge representation of real world, expressed in restricted real (Indian) natural languages (as Hindi and Telugu). Object oriented database schema definition is performed in terms of frames. Multiple instantiations of such frames correspond to data objects of real world with their interrelationships. An object oriented DBMS will be capable of performing the mapping of the objects of the frames to appropriate storage structures. The querying of the database will be in (restricted) Indian languages (as Telugu & Hindi).

This approach has the potential for building up an object oriented environment for database definition and retrieval in real (restricted) natural (Indian) languages. Extending the approach in this paper for other Indian languages will permit database query interaction in multiple (Indian) natural languages, while the database itself continues to be language independent.

Future work will be in the direction of development of the detailed design of the various mapping mechanisms for a DBMS referred earlier and also extending the root suffix analysis approach to various other Indian languages.



LPn is language processor for n^{th} Indian language.

Fig. 5. Database interaction through (Indian) languages.

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COMPUTER UNDERSTANDING OF PÂNINI'S SAMJÑÂSÛTRAS

Saroja Bhate

The mathematical character of *Pâṇini's* grammar has tempted quite a few computer scientists to consider it for preparing an expert system. The task is both, simple and complicated, as is the case with any other mathematical model. It is simple as far as its character as a finite set of rules explaining infinite linguistic facts is concerned. It is complicated, because it involves a number of hurdles to be crossed before one reaches the goal. Foremost hurdle is the *phit sûtra* style involving use of code language. Further, the arrangement of the *sûtras* according to the principles of *anuvṛtti* has created another barrier on the way to the clear understanding of the rules. The logic and clarity being thus sacrificed at the altar of brevity, a Pâninian student has to seek help from commentaries as well rules of interpretation (*paribhâṣâs*). Although *Pâṇini* has provided an aid for understanding his rules in the form of *samjñâ* rules and *paribhâṣâ* rules, these rules in turn presuppose a thorough knowledge of quite a few Pâninian techniques. For instance, *vṛddhirâdaic*[1], which is the opening *sûtra* of the *Aṣṭâdhyâyî*, presupposes acquaintance which the grammatical notions like *pratyâhâra* and *taparakaraṇa*. For the computer understanding of the *samjñâsûtras* of *Pânini* the knowledge of the grammatical categories like number and person as well as of the metalinguistic rules about the use of case etc., is a prerequisite. For a proper understanding of the *kârakasamjñâs* the computer needs to possess the knowledge about semantic abstraction of different linguistic expressions. A few more difficulties are faced by the student, because the computer lacks the ability of logical reasoning. It can be, however, supplemented in the form of a set of rules which may help the computer to

1. Ex. P.I.1.1. वृद्धिरादैच् '*â, ai* and *au* are (called) *Vṛddhi*'

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interpret the *samjñâsûtras* without resorting to the commentaries. A careful student of *Pâṇini* can discover the basic Pâninian assumptions which are implicit in the working of the *sûtras* and formulate them as rules of interpretation. What follows is an exercise in this direction with a view to preparing an expert system for Pânini's grammar. This exercise is confined to the *samjñâsûtras* in the *Aṣṭâdhyâyî*.

A critical study of the *samjñâsûtras* reveals the fact that *Pâṇini* has defined the *samjñâs* in different ways. While some *samjñâs* are stated in the simple formula 'a is (called) b'[1], some others are defined in terms of their structure[2] or function[3]. A few *samjñâs* are defined by enumeration[4]. Finally, there are a few *samjñâs* which are semantically defined[5]. *Pâṇini* could not follow a uniform method for teaching the *samjñâs* because they belonged to different levels of his description of the language. Yet his *samjñâs* evince a few common features which may help his student to fix certain norms of their interpretation. A scrutiny of the Pâninian *samjñâsûtras* reveals the following rules implicitly followed by *Pâṇini* while formulating them :

i. A *samjñasûtra* consists of two components : a *samjñâ* and a *samjñin*.

ii. Both the *samjña* and the *samjñin* are mentioned in the nominative case.

iii. A *samjñâ* can be distinguished from the *samjñin* on the basis of the following criteria :

---

1. Ex. P.I.1.1. वृद्धिरादैच् '*â, ai* and *au* are (called) *Vṛddhi*'.
2. Ex. P.I.4.18, यचिभम्, 'that (word) which precedes a *svâdi* suffix beginning with *i* or a vowel except the suffixes called *sarvanâmasthâna* is (called) *bha*'.
3. Ex. P.I.4.59, उपसर्गाः क्रियायोगे '*Pra* etc. are (called) *upasarga* when they are connected with an action'.
4. Ex. P.II.1.3, प्राक्कडारात् समासः 'whatever (is taught in the rules before the rule containing the word) *kaḍâra* is (called) *samâsa*'.
5. All *kârakasamjñâs* belong to this category.

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(a) A *samjñâ* is a shorter expression for a larger content[1]

(b) A *samjñâ* always consists of a single word, whereas a *samjñin* may consist of a phrase containing more than one word[2]

(c) A *samjñâ* can be a code word without any literal meaning[3]

iv. Generally, one *samjñâsûtra* defines one *samjñâ*. Very few exceptions like P.I.2.27, *ûkâlo'jhrasvadîrghaplutaḥ* where three *samjñâs* - *hrasva, dîrgha* and *plûta* - are defined together, exist.

v. The grammatical number in which a *samjñâ* is mentioned is insignificant. Thus the *sarvanâmasamjñâ* defined as *sarvâdîni sarvanâmâni* (I.1.27) in plural does not mean that it is always used in plural.

vi. If the *samjñins* of a certain *samjñâ* are more than one, the *samjñâ* applies separately to each one of them. For instance, the *vrddhisamjñâ* applies to the three vowels *â*, *ai*, and *au* separately rather than collectively. The *samyogasamjñâ* taught by P.I.1.7, *halo'nantarâḥ samyogaḥ* '(a cluster of) consonants immediately continuous to each other is (called) *samyoga*' is the only exception where the *samjñâ* collectively applies to all consonants together. On the whole a *samjñâ* is disjunctively connected with its *samjñins*.

These criteria may help the computer identify a *samjñâ* and establishing its relation with its *samjñins*. However, it may face a problem at a further step. Sometimes a *samjñâsûtra* contains two *samjñâs*. It is apparently not clear which the *samjñin* is. For instance, P.I.2.42, *tatpuruṣaḥ samânâdhikaranaḥ karmadhârayaḥ* contains two *samjñâs*, namely, *tatpuruṣa*

1. For instance, वृद्धि is a संज्ञा for the three vowels *â*, *ai* and *au* (P.I.1.1); घ is a संज्ञा for the two suffixes, तरप् and तमप् (P.I.1.22).
2. For instance, P.I.1.73 defines वृद्ध as वृद्धिर्यस्याचामादिस्तद् वृद्धम् 'that is (called) वृद्ध whose first vowel is वृद्धि'. Here the phrase वृद्धिर्यस्याचामादिः is the संज्ञिन्.
3. For example, *samjñâs* like टि, घु, घ, and भ do not convey anything.

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and *karmadhâraya.* In a situation like this the computer needs a clue to identify a *samjñâ*. The clue is provided by the following rule which is based on commonsense logic :

vii. That which is known from other sources is the *samjñin;* a *samjñâ* is that which is unknown.

In the present context the *tatpuruṣasamjñâ* is already taught by the rule *tatpurusaḥ* (P.II.1.22), while the *karmadhârayasamjñâ* is taught nowhere else. Therefore, *tatpurusa* is the *samjñin* and *karmadhâraya* is the *samjñâ.* Similarly, the *laghusamjñâ* defined by P.I.4.10 *hrasvam laghu* as 'a short vowel is (called) *laghu'*. Here both *hrasva* and *laghu* are *samjñâs*. However, since *hrasva* is already defined by P.I.2.27, it becomes the *samjñin* of *laghusamjñâ.*

Although generally a *samjñâ* is a shorter expression for a larger content, there are a few *samjñâs* which contradict this observation. For instance, *sarvanâmasthâna* which is the largest Pâninian *samjñâ* is defined as *si sarvanâmasthânam* (P.I.1.42) '(the suffix) *si* is (called) *sarvanâmasthâna*'. Here one has to search for another criterion to arrive at the desired meaning of the rule. It may be formulated as follows :

viii. There are two types of *samjñâs : svarûpasamjñas* and *arûpa samjñas*. A *svarûpasamjña* is a phonemic *samjñâ;* it conveys the phoneme(s) of which it is made. An *arûpasamjñâ* does not convey the phoneme(s) of which it is made. For instance, a *pratyâhâra* like *aic, en* or a suffix like *si* are *svarûpasamjñas* whereas terms like *vrddhi, sarvanâmasthâna* are *arûpasamjñas.* When a *svarûpasamjñâ* and an *arûpasamjñâ* occur side by side in a *samjñâsûtra,* the *arûpasamjñâ* is the *samjñâ* while the *svarûpasamjñâ* is its *samjñin.*

This criterion helps the student to fix *sarvanâmasthâna* as the *samjñâ* in spite of its being larger than the *samjñin.*

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PRONOMINAL REFERENCE AND INFERENTIAL MECHANISM IN MICRO-STRUCTURAL REPRESENTATION

K. C. Dash

Micro-structural Representation refers to a level which deals with the representation of connected expressions. In other words, it deals with the representation of different kinds of relations that are realised between clauses in a single sentence and between two or more consecutive sentences. This representation describes a set of expressions tied together by some logical or grammatical and rhetorical relations such as causation or condition etc., in order to convey the intention of the whole text. This requires the knowledge not only of the structure but also of overall extra-linguistic interferences. We can examine a complex expression such as :

Yadâ yadâ hi dharmasya glânir bhavati, bhârata ।
Abhyutthânam adharmasya tadâtmânam srjâmyaham ।।

(Gîtâ, 4-7).

Whenever there is decline of righteousness and rise of unrighteousness, I manifest myself, O, *Bhârata* (*Arjuna*).

This expression conveys some clausal connecting relations like temporal and causation etc. This may be represented by a set of expressions as follows :

E_1 (*yadâ yadâ hi* E_2 E_3)
E_2 (*glânir bhavati*)
E_3 (*abhyutthânam adharmasya*)
E_4 (*tadâtmânam srjâmyaham*)

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The computer understanding of the *samjñâs* defined by enumeration requires yet another logic to be followed. For instance, the *samâsasamjñâ* is taught by as many as 108 rules. All these rules need to be understood as *samjñâsûtras* and interpreted accordingly.

For understanding the *kâraka* terms knowledge of semantics is essential. For instance, in order to understand the *apâdânasamjñâ* laid down by the rule *dhruvamapâye'pâdânam* (P.I.4.25) 'the fixed point in relation to separation is (called) *apâdâna*' the student must know what a *kriyâ* 'action' is and what is meant by *dhruva* 'fixed point' in relation to *apâya* 'separation'. The extra-linguistic character of these definitions takes the student away from the domain of grammar into the domain of linguistic philosophy.

An attempt was made in the foregoing pages to unearth the basic rules of interpretation tacitly followed by *Pânini* while formulating the *samjñâsûtras*. They may help a better and easier computer understanding of the *samjñâsûtras*.

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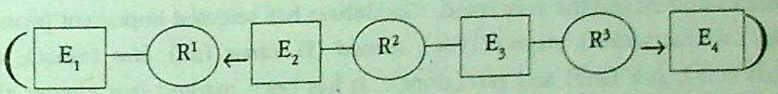
This is a formal representation of the surface structure. This involves both temporal and causal relations. The expression may be formalised as :

$$E_1 \; [\; yad\hat{a} \text{ (when) } E_2 \text{ and } E_3 \,] > E_4.$$

In this case, (*yadâ*) WHEN in Expression 1 points to temporal relation and > stands for causal relation.

But internal representation requires more specification of elementary relations between objects and also defining the nature of the relations that hold between caluses and sentenses in a complex form of expression. Generally, the relations are marked by certain connectives in English. For example, CAUSATION by *because, since, as etc*. CONDITION by *if .... then*, CONTRAST by *but*, COLLECTION by *and*, and TEMPORAL by *after, before, when, whenever, etc*. As far as the formal aspect of an expression is concerned such types of relations hold good in most of the situations in Sanskrit. But in internal representation the dependency of the structure is determined first and then the nature of relation is specified.

The internal representation of the above expression may briefly be stated as :



(R = Relation, R^1 = Temporal, R^2 = Collection
R^3 = Causation ← = includes, → = leads to)

Pronominal Reference

In micro-structural representation pronominal reference serves as the important linking factor. As a matter of fact, a pronoun demonstrates the referential identity of the replaced individuals, facts and things etc. I have pointed out elsewhere (Dash K.C.:1986:101) that there are two major categories of pronouns distinguished by the linguists. One is pragmatic category which is directly involved in the speech act. This includes first, second and third person pronouns like *I, we*,

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you,he, she, it and *the* etc. The other category is called anaphoric pronoun which is used to refer to individuals, things and events etc., that are otherwise mentioned in the sentence itself. This includes also relative and reflexive function of the pronouns.

In Sanskrit, the case is little different. *Pâṇini* has given the rule (*sarvâdîni sarvanâmâni*, 1.1.27) for pronouns which just enumerates the same. As far as the meaning aspect is concerned the grammarians simply follow the dictum that *sarvanâmnâm utsargataḥ pradhâna parâmarśitvât*) pronouns generally refer to the main element of the expression. The logicians, as the *Nyâyakośa* (1978:177) records, hold that a pronoun refers to (*vaktṛbuddhi viṣayatâvacchedakatvopalakṣitadharmâvacchinnatvam*) what is delimited by a property indicated by a delimiting property 'contentness' subsisting in the intellect of the speaker. In other words, a pronoun refers to a property which has already formed itself as the content in the mind of the speaker. This shows that a pronoun is generally a replacement or a substitute and semantically a follower of its antecedent. Moreover, antecedency serves as the domain of pronominal reference.

Gadâdhara, the noted Neo-logician, has elaborately discused the function and scope of major pronouns. The meanings of those may be presented briefly here to understand the very stand. Gadâdhara has selected important pronouns like *tat* (that/which), *yuṣmad* (you), *asmad* (I), *sarva* (all), *kim* (what), *idam/ etad* (this), *sva* (self) and *eka* (alone). It has been marked that almost all the pronouns except *yuṣmad* (you) and *asmad* (I) are antecedent-constraints. The relationship between antecedent and the pronoun is mostly 'identity' which is indicated by their co-reference through the verb of a given situation. But the pragmatic pronouns like I and You, according to *Gadâdhara*, are always independent in making their reference.

The meanings of the above pronouns are presented as follows :

Tat (that / which) points to what is characterised as the content in the mind of the speaker. Independent utterance is the ground for the use of *asmad* (I) and

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this invariably points to the speaker who utters the very word. Independent utterance here means the utterance which is not constrained by intentionality of any other utterance. The pronoun *yuṣmad* (you) is used to refer to 'addressee'. A sense of pervasiveness is the undertone of the pronoun *sarva* (all). However, four types of meaning have been specified by *Gadâdhara*. They are : 1) *asesa* (without a remainder), 2) *aneka* (many/not one), 3) *pratyeka* (everything) and *4) yâvat* (as many as there/whatever upto). The pronoun *kim* is used to express a desire to know-about. The pronoun like *idam/etat* points to the content of perceptive cognition.

The reflexive pronoun *sva*(self) has mostly the anaphoric function. Although *eka* is used as a number it serves as a pronoun in many situations. It points to something single or *kaivalya* (aloneness).

In view of the importance of the pronominal reference we can examine the following micro-structure :

devadattaḥ bâlakaḥ. Saḥ pustakam paṭhati.
Tat Râmâyaṇam. Tatra râmakathâ asti.

Devadatta is a boy. He reads a book. That is *Râmâyaṇa.* The story of Râma is there.

The paragraph is a kind of story. It contains four independent expressions in its surface level. But in underlying level it is a micro-structure. We can analyse this on the basis of its conceptual centrality and subordinate ideas. The structure may be arranged in the following manner :

E_1 *Devadattaḥ bâlakaḥ.*
CE *Saḥ pustakam paṭhati.*
E_2 *Tat Râmâyaṇam.*
E_3 *Tatra râmakathâ asti.*

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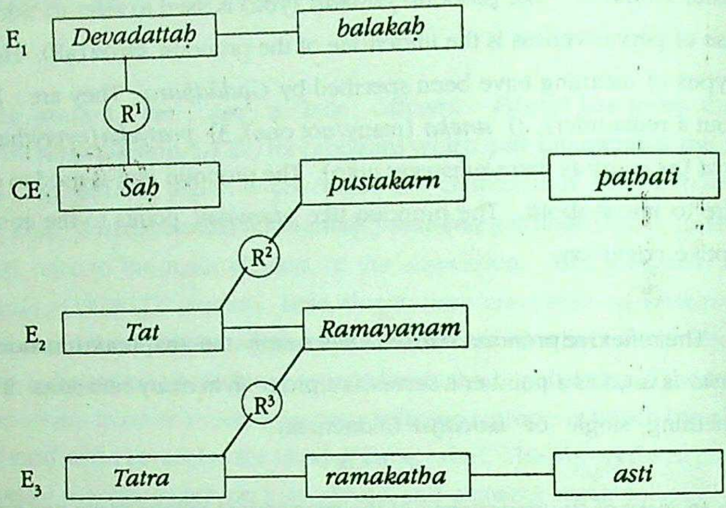
The following micro-structural graph presents the surface relations which link the expressions uniquely.



E = Expression

CE = Central Expression

R^1, R^2 = Relation of identity

R^3 = Relation of substratum-hood.

Since the pronouns *saḥ* and *tat* are used co-referentially infirs and second cases respectively and agree with the verb *paṭhati*, they point to the relation 'identity'. Similarly, the form *tatra,* as it embeds a locative marker, points to the relation substratum-hood.

Thus being connected with each other, the very set of expression is treated as a single structure in point of its conceptual centrality. Such a structure is called *mahâvâka* 'complex sentence' in Sanskrit due to the fact that it conveys a meaning of integral character (*akhanḍârtha bodhaka*). It has been clearly stated in *Sâhityadarpana* (2/1) that a cluster of sentences make a *mahâvâkya*. To this effect, the author quotes from (*Tantravârtika*) that (*svârthabodhasamâptânam aṅgâṅgitvavyapekṣayâ* I *Vâkyânâm eka-vâkyatvam punaḥ sambatya jâyate*) a

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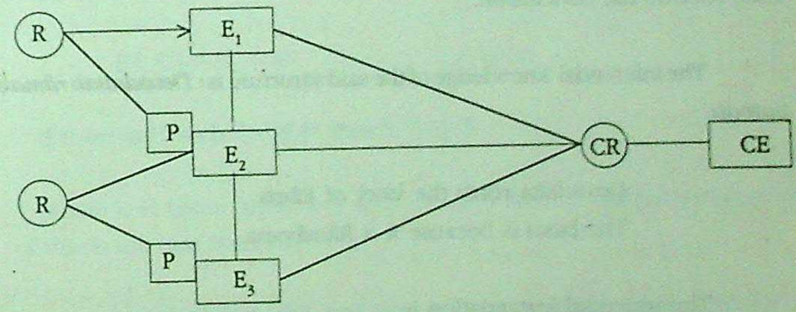
single structure is produced out of expressions which do not have mutual expectancy, in consideration of prominence and subordinateness to express a unified meaning. The idea is that the expressions which contain independent meanings are related mutually in order to achieve an integral understanding of the facts presented in a text. The texts like *Râmâyaṇa and Mahâbbhârata* are treated as single structures in view of conceptual centrality and subordinateness of the facts embedded in different expressions.

Moreover, the logicians have admitted that the knowledge of meaning of a subordinate expression is a cause for bringing about the knowledge of the meaning of a complex expression. *Nyâyakośa* (1978:650) records this fact (*mahâvâkyarthabuddhim prati khaṇḍavâkyârthajñânam kâraṇam*) and also admits that the syllogistic expression consisting of five parts is regarded as *mahâvâkya* and the parts are bound by causal relations.

Further, it has been recognised that there should be mutual expectancy among the constituent parts of a structure. Since a micro-structure embeds different types of expressions as its constituents it realises expectancy in its underlying level in order to achieve completeness in meaning. As seen above, the pronominal reference fulfils the requirement of this sort by indicating expectancy in the way in which it is used. The internal representation, therefore, takes the following shape :



CR = Causal Relation

R = Relation

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P = Pronoun
→ = Refers to
↔ = Mutual expectancy

This diagram shows that there is a causal relationship between the knowledge of the meaning of central expression and that of its constituents. It becomes evident from this that in any type of micro-structural representation there should be two types of knowledge, namely, 1) cause-based knowledge and 2) effect-based knowledge. The pronouns perform the works of pronominalization, relativization and reflexivization etc., through certain relations. The constituent expressions obtain expectancy mainly through pronominal references.

Inferential Mechanism

It is also a fact that there is an inferential mechanism which make the text-structure comprehensible. The process of understanding invariably involves the problem of deriving possible inferences. The system of deriving inferences suggests the fact that one should find out the central idea from among the meanings of expressions. This idea, in other words, is the (*mahâvâkyârtha - buddhi*) knowledge of the meaning of the whole structure. This is a kind of product of inferential knowledge. For this, one has to find out its basis on which the inference has been derived. When the basis or cause is determined the process of universal instantiation starts in the form of invariable concomittance. Then follows the conclusion.

The inferential knowledge of the said sttructure is : *Devadattah râmakathâm pathati.*

Devadatta reads the story of Râma.
The basis is because it is Râmâyaṇa.

The universal instantiation is

yatra yatra râmâyaṇatvam tatra râmakathâtvam.
Wherever there is *Râmâyaṇa*, there is the story of *Râma.*

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It is to be noted that there are two ways of expressing universal instantiation in Indian logic, such as :

1. *Yatra yatra ... ... tatra ... ...*
   wherever ... ... there is ... ...
2. *Yat yat ... ... tat ... ...*
   whatever is ... ... is ... ...

This form, in other way, points to the fact that if two things are tied together by a causal relation such that the effect cannot exist without a cause, then when effect is known the cause must be presupposed. In other words, effect knowledge implies the cause knowledge. Thus the propositional forms "wherever....there...." and "whatever is ... ... is ... ... " pressuppose the propositional function "if ... ... then ... ... ". In consideration of this, the form of universal instantiation becomes something like "there is H (*hetu* 'probans') such that if H then S (*sâdhya*. 'probandum'). This may be formalised as [H.(H > S)].

Moreover, in Indian logic, universal propositions have an existential import. The universal instantiation, therefore, not only refers to the relation between H and S but also indicates their existence.

As far as the present position of the structure is concerned the inferential process may be described in the following form :

[H. (H > S) > S]

If there is H such that if H then S, then S.

[There is H (*hetu* 'probans') such that if H then S (*sâdhya* probandum) and of this is the case then (infer) S].

As a matter of fact, the text comprehension involves the process of language understanding. This needs specification of all the items embedded in a particular expression or text. The system of story comprehension invariably

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points to the extraction of inferences which are appropriate and correct. In this case, the inference takes its basis from causal reasons. The inferential process, in other words, is a search for overall explanation of the fact which is the content of entire text. The AI researchers use *abductive inference* in such a situation. Abduction is described as a process of generating explanation. The idea will be more clear from the passage of Eugene Charniak and Drew Mc Dermott (1985:453)

Abduction is the generation of explanation for what we see around us. Thus we noted that it would be thought of as having the following form :

$$(\text{if ab}) \quad \frac{b}{a}$$

For example, when people are drunk they do not walk straight. If Jack cannot walk straight, we might guess that he is drunk.

[If (drunk ? person) [not (walk-straight ? person)]]

$$\frac{\text{[not (walk - straight Jack)]}}{\text{(drunk Jack)}}$$

Thus abduction tells us that one hypothetical explanation for Jack's inability to walk straight is that he is drunk. Naturally, this is only a guess, for it may be that Jack just got off a roller coaster and is still dizzy from the experience. Thus abduction is only *plausible inference.*

Abduction is mostly based on the concept of causality. The difficulty with abductive reasoning is that we don't have definite and correct conclusion always. However, it is employed to give explanation of the fact on the basis of causal connections.

The idea of abduction is very close to the early concept of inference in Indian logic. The *Nyâya Sûtra* (1.1.5) records three kinds of inferences (*atha tatpûrvakam trividham anumânam pûrvavat śeṣavat sâmânyatodrstam)* such

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as : 1) having the antecedent as the probans, 2) having the consequent as the probans and 3) causal relation ascertained through general observations.

Vâtsyâyana, the author of *Nyâyabhâṣya* elucidates the very concepts in the following manner :

1. Pûrvavat

The effect is inferred from its cause.

For instance, (*meghonnatyâ vṛṣṭih*) 'from rising cloud (it is inferred that) it will rain'.

This is something like :

(y x) : y is caused by x,

x : there is x,

— : therefore (hypothesize)

y : y

2. Śeṣavat

The cause is inferred from its effect.

For instance,

(*pûrvodak viparîtamudakam nadyâḥ pûrṇatvam śîghratvam ca dṛṣṭvâ srotaso 'numîyate bhûtâ vṛṣṭiriti*).

On perceiving the water of the river as different from what it was before, (and further seeing) the fullness of the river and swiftness of current, it is inferred that there was rain.

This form is like :

(x y) : x causes y

y : there is y

— : therefore (hypothesize)

x : x

3. Sâmânyatodrsta

This does not require a direct invariable causal connection. The requirement is the *hetu* 'probans' something other than the cause or the effect.

The *hetu* serves here as mere indicator.

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For instance, 'from the sight of ducks at a distance one infers water'. This shows that there is no cause-effect relation between duck and water. [It is to be noted that the interpretation (of this type of inference) given by *Vâtsyâyana* has been included in *śeṣavat* inference by *Uddyotakara*, the author of *Nyâyavârtika*. Therefore, the example of *Vâtsyâyana* is not given here].

The form is something like :

I (x y) : x indicates y

x : there is x

— : therefore (hypothesize)

y : y

This approach of inference is mostly based on the notion of causality and logical implication. Although two notions stand very close to each other the logicians prefer to use causal notions in the framework of logical implication because it helps to reach a definite conclusion.

These are some of the ancient inferential tools which may be used as abductive projections for understanding the representation system.

Conclusion

The representation system whether micro-structural or macro-structural starts with syntactic processing with support of referential and inferential techniques. As far as the processing part is concerned computer requires precise rules which would work in all cases. To this effect, this attempt is just a peep into the past and projection into the future state of building a system.

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INAUGURAL ADDRESS

(Extract)

Raja Ramanna

To bring Sanskrit into the laboratories, into the theoretical institutions is a thing I was always looking forward to. It is very difficult to make the connection between what are the needs of Sanskrit, what is in Sanskrit knowledge and science. And in this [regard] I think we are right on the royal road of progress. And therefore I must congratulate Prof. M. A. Lakshmithathachar, and his colleagues from Melkote and all the other scientists who are collaborating here to - for fulfilling a program which according to me - as Indians - should come as top priority. A deep understanding of what is in Sanskrit literature requires a thorough understanding of Sanskrit grammar, Sanskrit words, the origin of the words, the philology and all the details.

I say all this because I had a recent experience. I was in Indonesia - Jakarta - a few weeks ago, for purely personal reasons. But I had time to sit and watch the people. And if you ask me the language, Bhâsâ of Indonesia - [it] is very proud of this fact - is the simplest possible language. If you buy a book on Bhâsâ - the first thing it says is that Bhâsâ does not have any grammar. And, besides, the Indians there - within two weeks time - will be speaking the language because there is no past, no future, no female, no male. It's all with reference to a particular object. Within a month's time they are masters at the language. And it really surprised me how some members of my - some relatives of mine were speaking Bhâsâ. So it made me think "What is the purpose of language ?" If you have to communicate and you have to learn that communication process then the Bhâsâ is very simple. And these are all functions of language. Then you start thinking, "If that is so, then why has Sanskrit, over the centuries, produced a complexity which requires

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conference after conference, and some such deep study and something written 2500 years ago is the Bible - Pânini's book ?" And I go and I find many pandits' children - they were young, they must be old now - in America, studying very hard - Pânini's grammar - expalining it to the Americans, and they - with full enthusiasm - listening. So what is the magic that is in Sanskrit language, which is dead, which is not spoken, and yet invites so many scholars - is itself a very interesting question to ask, ... [Dr. Ramanna suggested that the answer could lie in the ability of Sanskrit to handle very complex ideas, concepts and situations.]

However, as a physicist, I know how physics is in problems - essentially because of semantics of language understanding. And quantum physics is in a particularly strange state. It has a theory which explains numerically many aspects of physical phenomena very successfully. ... Nobody wants to give it up because it is so successful in explaining such a wide variety of things we observe, first with our eyes and then with very sophisticated equipment. And yet the situation [of linguistic communication] is getting worse everyday. ...

(Excerpts from the recording)

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KEY-NOTE ADDRESS

(Extract - Section IV)

K. T. Pandurangi

For computation of a language one has to study the language at two levels viz., the structure of the language and the semantics of the language. The items that come under morphology are concerned with the structure of the language. This aspect is fully treated in Pânini's grammar and his methodology itself is a methodology of computation. Therefore, computer instructions could be easily formulated to identify and present the words concerned. *Sandhi* rules, *prakṛti-pratyaya* scheme etc., come under this.

It is in the area of semantic organisation that a good deal of work has to be done.

Firstly, the major semantic concepts in Sanskrit language have to be studied and classified as 'primary and secondary', 'allied and dissimilar', 'substantive and conjunctive', 'habitual and contingent', and so on.

Secondly, different layers of the language such as ordinary, poetic, sâstraic, have to be distinguished and words and phrases peculiar to each area have to be processed. A programme for the processing of the sâstraic technical words itself will be a useful programme.

The theories of word meaning, sentence meaning, different levels of communication, the criterea to determine the purport have to be carefully studied and demarcated for the purpose of computation.

1) In respect of word meaning three views viz., *Jâti, Vyakti* and *Jâti-viśiṣṭa Vyakti* are current.

2) As regards the focal points of the Semantic organisation in a sentence, three views viz.,

i) *Prathamântamukhya viśeṣyakatva*

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ii) *Dhâtvarthamukhya viśeṣyakatva* and
iii) *Bhâvanâmukhya viśeṣyakatva* are current.

3) In respect of the levels of meaning, three levels viz.,
i) *Abhidhâ, Lakṣaṇâ* and *Vyañjanâ* are current. In *Vedânta Akhandârtha Aparyavasitavṛtti* and *Paramamukhyavṛtti* are utilised.
ii) *Rûdha, Yougika,* and *Yogarûḍha* are the three types of meaning. *Mahâyoga* and *Vidvadrûḍhi* are two more in *Vedânta.*

4) The *Sphoṭa* concept is a special contribution of the Indian Linguistics.

Some of these theories of meaning are connected with the metaphysical theories of the respective schools. For instance, *Apoha* theory of the meaning propounded by the Buddhist is closely connected with their *Svalakṣaṇa* doctrine. *Vaktavya* and *Avaktavya* theory of meaning of the Jains is connected with their *Dravyanaya* and *Paryayanaya* doctrine. *Akhandârtha* theory of meaning and *Aparyavasitavṛtti* theory of meaning of *Advaita* and *Viśiṣṭâdvaita* are connected with the respective *Vedânta* doctrines. *Sarvasabdavâcyatva* is *Dvaita* approach.

Just as Western linguistics is influenced by Empiricism and Rationalism, the Indian linguistics is also influenced by *Vedânta* thought and *Nyâya* methodology.

Probably, now we have to move from Metaphyscis to Physics to computerise the Sanskrit language and the thought represented by it.

This Seminar is a good step in this direction. However, I suggest that two or three weeks Summer and Winter courses be organised on this subject involving Sanskrit Scholars, Linguistics Scholars and Computer Experts. This will enable greater interaction and deeper understanding.

A Diploma course in Sanskrit and Computer may also be thought of.
Thank you

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SOME GENERAL REMARKS

H. N. Mahabala

Being associated with the idea of applying Sanskrit linguistics to computational linguistics from its very beginnings, Dr. Mahabala started with a note on the first step toward its concretization - the KRIS (Knowledge Representation in Sanskrit) conference. *"I have been often asked what was the follow up of that conference. There were many ideas - that's why we should have many ideas now also. But one or two bore fruit. One of course is this research institution continuing the work. The second is the cooperation between a scholar from Tirupati and IIT Kanpur which led to great deal of work. We should not be discouraged that only one worked rather than many. But one did work, two did work."*

And what next? *"And somebody asked me about the plan for next 10 years. My reaction was we will draw anything and everything. And it has to be centered around individuals because we have not reached a stage when we can set out a program and go around recruiting people for it. We cannot do that. ... I do hope that out of this (Seminar) will emerge a few more collaborations of the kind between Kanpur and Tirupati and this research Institute."*

What does it take to marry two seemingly disparate fields? Dr. Mahabala delved into a bit of history to illustrate his point. He noted that the paper which started the bandwagon was a paper by Richard Briggs in AI Magazine. Briggs was a Computer Science major - with Sanskrit as minor - at University of California, Berkeley. He chanced upon a book on *sâbdabodha* in the library and recognized a bridge between the two fields.

Prof. Mahabala said that we can try to recreate the situation which happened through chance. "*[An] AI teacher can teach some portions of AI namely semantic nets and the like - it is a vast subject - and have as a co-teacher or adjunct faculty a Sanskrit scholar sharing may be one out of three lectures or four. The idea is to come together and I think that the students will find the link. Both of these may not find but the students will find*

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because that is what lateral thinking is all about. Throw some words at people, even though they are disconnected, when the mind is in the right state, it will find the connection." Is this approach assured of results? *"Even if nothing happens, the student would have learned a little bit of Sanskrit and the teacher would have learned a little bit of Computer Science, and it does not matter very much. Because we are not in a position to ask for achievement or result in any time-bound manner. It could happen, or it could take a lot more time."*

What are the potential areas in which Sanskrit can contribute fruitfully?

According to Prof. Mahabala, a major candidate is the theory of interpretation. *"Sanskrit scholars of yore, no matter how far they are apart, no two scholars will interpret something differently. Probably that was their main concern. Otherwise, it could not have been passed from generation to generation or they could have an argument if each one understood differently. They were very much concerned about everybody understanding in exactly the same way. Which means that there are certain rules and procedures that will force them to come to the same conclusion. This is not to mean that new ideas cannot come - [there is much latitude in] the way we present it, the way we discuss it, the way we draw the deductions, etc."* Dr. Mahabala felt that if these rules - available in the sâstras - can be made available to the computer science community and are programmed, a computer will follow them much more precisely than human beings. We can test these rules on topics of current interest also - for example, news items.

Dr. Mahabala then reminiscenced about a similar project by Charniak at MIT - a program that can understand fairy tales. The program tries to answer a few questions after processing a passage. The program was a modest success, he added.

Dr. Mahabala concluded that a vast treasure house of knowledge is available in Sanskrit and that by asking the right questions one can find the right answers. Sanskrit scholars should help us in this endeavor.

(Extracts from the recording)

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PANEL DISCUSSION

The Panel Discussion was the concluding session of the Seminar. The Panel consisted of Dr. R. Narasimhan (Chair), Prof. D. K. Subramaniam, Dr. Saroja Bhate, and Prof. P.K. Mukhopadyay. Dr. Narasimhan invited members of the audience to express their views.

Dr. C. S. R. Prabhu :

Dr. Prabhu opening the discussion limited his comments to computer-related topics. He spoke of the machine translation system developed by him which translates from Hindi to Telugu and needs the help of experts in Bengali, Konkani, Marathi, etc. for expanding its scope. Referring to the application of Nyâya logic to database modeling he said *"Today's trend in databases is to deal with objects. The only difference between the semantic databases and object-oriented databases - both object-oriented - is that you will have the dynamics of object orientation taken care of in the object-oriented DBMS environment in terms of encapsulation, information hiding at run-time, and so on, whereas in the semantic databases you don't have that kind of a thing - only object structure and object hierarchy are available."*

Talking to Dr. Dash and Dr. Mukhopadyaya he found *"The concepts of Navya Nyâya can be easily incorporated into a new semantics of object-oriented data model which will have much more power than any present models in the whole world. The present models are not really considering the kinds of issues and problems which we usually consider in Nyâya and Navya Nyâya, including the identity or the relationships or the ontological relationships and so on. In fact, I have started on what is currently called Natural Language-based Semantic Data Model. These are object-oriented models where you have natural language case structures along*

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with some other non-case relationships like ontological and logical and so on. There should be further extensions provided there is a strong cooperation with the Naiyâyikas with the Computer Science people - for example me because I don't know anything in Nyâya!. "

Dr. Prabhu concluded his intervention with some comments on lack of coordination among workers in the area. He observed that three different groups - his group, one in Bangalore, and one in Pune - are involved in implementing similar portions of the Paninian sutras. *"So if only this could be conglomerated or consolidated and integrated to avoid redundancies and duplications there would be much better progress with the objective that the major portion of the Paninian framework should be implemented. Somebody can do subantas, somebody tinantas, and somebody krdantas. If we distribute the work, in five or ten years we can have the entire Paṇini system implemented on a machine."*

Dr. T. V. Anantha Padmanabha :

Dr. T.V. Anantha Padmanabha brought several new dimensions to the discussion - those of cognitive validity and experimental studies.

He cited the two different schools of sentence comprehension - that of *anvitâbhidâna* and *abhihitânvaya*. *"If we take them seriously as models in our brain - as cognitive models - it should be possible to design experiments to test these models. I will give one specific example. It is from a thesis from Harvard and the title of the thesis is 'Word, Object, and Concept'. What [the experimenter] has done is she asked children between ages 3, 4, 5, etc. questions like 'Have you seen a dog?' 'What does a dog look like?', and then she [asked] 'What is a dog?' "* With this example he juxtaposed a learning scenario mentioned in one of the talks in the previous day, to illustrate one view of word comprehension available in Sanskrit *texts*. *"In front of a child, the parent says "Bring a cow" and a cow is brought. Now the parent says, "Take away the cow and bring a horse". Watching the transactions, the child comes to associate the former entity with the word "Cow" and the latter with the word "Horse" - according to this view."*

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Dr. Padmanabha said of the Harvard study: *"The way the experiments have been designed is very interesting - how to extract, how the word and the meaning relationship are extracted, etc. It is possible to design such experiments to verify the so -called theories which we are propounding - like vidvan Varadacharya mentioned about the two views [of sentence comprehension]:"* To test the neurophysiological plausibility of various views, Dr. Padmanabha suggested an experiment. *"For example we can create a sentence in which some of the words are not heard properly - let us say the noun is not pronounced properly. Take a sentence and distort the words - add noise to the noun, add noise to the verb and then we don't hear the verb or the noun properly but we still extract the meaning. In some cases each particular word has a dominant role in extracting the meaning."* The results of this experiment should guide future discussions. Dr. Padmanabha also mentioned that similar efforts should be undertaken to resolve the controversies regarding the śâbdabodha.

He summed it all up by saying *"Other than the explanation or theoretical aspects, we should design certain experiments - practical experiments - to verify these things and see how far this should be taken seriously as cognition in the brain or just as explanatory models."*

Dr. R. Narasimhan :

Dr. Narasimhan, who is also a psycholinguist, could not help making an intervention here. He concurred with the points made by Dr. Anantha Padmanaba and observed that to test the cognitive validity of Indian linguistic theories there is a need to design and conduct psycholinguistic experiments. This necessitates bringing in another group of specialists in to the ongoing dialogue - psychologists - in addition to Sanskritists and computer scientists, he added.

When the first initiative was taken three or four years ago in bringing together traditionalists and computer scientists the general belief was that *"the main problem might be one of probably "bridge building" - how to break the communication barrier - and who the bridge builders will be i.e.,*

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whether the initiative should be taken by computer science people or should that be taken by traditional Sanskrit people and so on. But now, having sat through this seminar for the past 2 days I see that bridge building is no longer an issue because we have at least half a dozen people here who seem to be exceptionally well versed in traditional scholarship and who are absolutely dirtying their hands by implementing programs. Now if any further dialogue is required between computer science and Sanskrit traditional pundits it is precisely these people who will be able to provide that communication bridge."

Dr. Narasimhan felt that there is an urgent need for this bridge-building to be expanded and that the initiative should be mainly from the Sanskrit scholars *"because they have this unique advantage of being able to talk to Sanskrit department people and the computer science people and they will have more credibility than the computer science people talking all by themselves."*

Turning to the nature of work to be done by the bridge builders, he said *"What should this bridge building Sanskrit scholars be doing? So far as they are able to talk to Sanskrit traditionalists, they should be able to reinterpret the tradition in terms of a new framework - computer science framework."*

Taking himself as an example, he observed that the people who do not know Sanskrit would be greatly benefited from reading reinterpretations of the original notions in contemporary language. Though Western scholars have already striven to give such interpretations, works by traditionalists in India will have their own advantages. Stressing the importance of the computational paradigm, he said: *"It turns out - at least many of us believe - that the computational framework offers an interpretative framework which is more appropriate to interpreting Indian Sanskrit tradition than the Western logical framework. Similarly, as Dr. Prabhu said, apart from the Paninian tradition - the linguistic tradition - the Nyâya tradition also seems to have considerable interest so far as computer science is concerned."*

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Dr. Narasimhan gave some pointers to how work along such lines is already in progress. *"There is a DST project, which is a national project, ... distributed throughout the country ... in a meeting in Madras we came to the conclusion that it is important to formalize some of this research [and put the] results back into the main stream of education. Two areas that seem to be profitable to try ... Paninian linguistic tradition and Navya Nyâya tradition. So the consensus was that the people working in these areas [should] try and formulate curricula which will be offered to both - by department of computer science, department of linguists and the departments of logic, for example. Over a period of time we can convince the educational authorities in this country to get the attitude that everybody who graduates from the department of computer science or department of linguistics or department of logic will necessarily have a working knowledge of what the Paninian tradition was, of what the Navya Nyâya tradition was. This, of course, requires that the scholars who are working in this area should prepare not only appropriate curricula [to be] offered as electives - may be in some cases can even be included in the core topics."* He added that these institutions will also train faculty members of other institutions who in turn will offer similar courses in their parent institutions and *"If in next five years we can accomplish this, this will be an accomplishment because then we would have made some substantial progress."*

Reverting to the role of bridge builders, *"So I suggest that first the Sanskrit scholars who have learned to function in both sides should try and make interpretative material available which try to explain the tradition in modern language or more understandable language so that such interpretative material is available for people like me or others who want to understand, so that they don't have to always look to the West in order to make this thing available. Now, not all of us, even though we are all born in this tradition, are literate in this tradition so that the problem is one of making literacy possible in this tradition."* Observing that specialists have been trained using the Western idioms, he said *"So if we can reinterpret, Navya Nyâyaa in terms of first order predicate calculus or if we can use first order predicate calculus to explain in what way Navya Nyâya is different, what additional*

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support it offers for logical inference making and things like that it would probably be grasped by people like us more readily than if original material is made available and if we have to interpret all this for ourselves. So there are two aspects - these two forms of enterprise which I think is possible to take now and the course of action has to be established."

In addition to reinterpretation, Dr. Narasimhan felt that there may be a need to reinvent some of the notions that might have been lost. *"... the bridge building Sanskrit scholars [should try] to talk to other Sanskrit scholars in order to try and understand the traditional framework as comprehensively as possible. If they feel, for example, that there are gaps then they should be able to try and talk to their colleagues or their gurus, in order to try to bridge this gap so that when they write the interpretative material, they will do that in a more comprehensive manner."* Addressing the ultimate test of comprehensiveness, he added *"... having grasped the traditional framework one would like to validate this framework in terms of its completeness and comprehensiveness and my feeling is that one of the strengths one derives by trying to implement this on a computer is precisely in being able to validate the comprehensiveness and completeness because if you explain this to other human beings, it is very difficult to find out how complete or adequate your explanation is because you have no control over the background the other people are bringing to bear upon your explanation. So even if the explanation has gaps, other people will be able to fill these gaps - unconsciously - without realizing that he [or she] is contributing all these. On the other hand, if you use a framework in order to implement the computer to do something - a task-*oriented *order to deal with a task-oriented world - then so far as the computer program is properly done, unless your input is complete and comprehensive and well validated, you will find that it is not coping with the task-oriented world. It is precise ... in the sense that it gives you a handle to test your theories, because you are able to test your theories, because the framework is ultimately the theory and to what extent the [means of handling] complications are adequate, you are able to test to what extent - by implementing on a computer in a task-oriented world. That I think is something which, is more involved*

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[and] the initiative has to come form Sanskrit scholars because they are the only ones who will be able to reinterpret [tradition] and work with the computer scientists in order to implement it on programs - to implement it on computers."

Having pointed out the directions for future work, Dr. Narasimhan turned to the state-of-the-art theories and trends in Artificial Intelligence. *"There is a tendency for Sanskrit scholars - both the bridge builders and the traditional scholars - to look with some kind of a awe on what computer people are doing. They seem to think that the computer scientists have all the answers and what the Sanskrit scholars have to do is merely borrow from them. That is very far from the true. Computer scientists are groping in the darkness and the knowledge representation that we are talking about now is already 10 years old and there is a fresh wave of thinking in the computer science research community and people no longer accept that knowledge engineering can be confined to engineering encyclopedic kind of knowledge. In other words, people increasingly subscribe to the view that all knowledge is not propositionizable and there is a whole lot of it - the common sense knowledge and knowledge as skill, for example. It is fairly evident that what the psychologists refer to as perceptual and sensory-motor knowledge is implicit knowledge and - although there are people who don't want to accept this - I think it is increasingly becoming evident that the basic perceptual-motor knowledge which is implicit is not propositionizable - in other words, we cannot capture all this knowledge in terms of knowledge engineering which ends up in a purely propositional mode. So that - I think that the awareness will come about only if we move away from theories - dealing with theories exclusively in the textual mode to other kinds of operational modes. In other words, if you think in terms of a robot or automation to doing things in the world - even if all it has to do is to walk around in a computer room - you will find that ... the knowledge-base we have to make available to the automation is very much more than the propositional knowledge-base because it has perceptual-motor skills which presumably will have to be deployed. Currently we don't know how*

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to capture this kind of a skill-based knowledge in terms of proposition-based formulations. So I would suggest that one way of trying to convince ourselves that the formulations that the Indian tradition has to offer is superior to or more complete than the formulations that people are groping with in the West if in such task-oriented worlds we are able to use this framework more successfully than frameworks using propositional knowledge-base. So I would like to suggest that ... computer science people ... should move away from the purely textual mode of operation to other forms of controlling behavior and try to test the adequacy of the frameworks ... in these kinds of tasks. What is happening in computer science in these areas is still in a very rudimentary stage and it is possible that one might be able to offer something new to even computer science community in the way of how to structure world knowledge, for example. Or, how to design a natural language interface so that such kinds of task-oriented behavior can be specified, can be generated, and can be controlled. So apart from what is said about designing psycholinguistic experiments and things like that, it seems to me [that these are the] important issues that we have to address increasingly rather than be satisfied with redoing whatever has been accomplished in the computer science field. This is already old and not commanding continued interest among computer scientists themselves. So "syntax", "semantics", "pragmatics" and so on is in some sense is very dated. No longer would one believe that syntax, semantics, and pragmatics can be carried out in a sequential fashion. It has to be in a much more integrated fashion. So, the question is: does the traditional framework have any light to throw on this or how do we grapple with these problems? It seems to be to be much more important. I would like to see more energy spent along these lines ... also [there is] a possibility of our accomplishing something new." Dr. Narasimhan invited comments from the other members of the Panel.

Dr. D. K. Subramaniam :

"I thought that serious computer scientists are coming."

Prof. Subramaniam was in complete agreement with Dr. Narasimhan's views. He said that at the first KRIS (Knowledge Representation in Sanskrit)

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conference most of the work to be done in Natural Language Processing was thought to be heuristic in nature but now the work on semantic nets and conceptual graphs [mostly naive representation schemes] has reached a dead end.

Observing that Indian scholars were grappling with issues concerning knowledge and arriving at answers for a long time, he felt that things would be easier if such works are put in modern notation. He cited a precedent for such a task. Shankaracharya Bharati Theerta wrote a book on Vedic mathematics. Many people, instead of understanding the science behind it, made arbitrary claims. This lead to some puzzlement for those trained in Western methods because of the question *"How can Indian mathematicians stray from the [usual notions of] relations, functions, or mappings and so on? How do we bring in the modern notational form that many of us who are unfortunately trained in those conditions can understand this?"* Prof. Bhanumurty of Madras took it as a challenge and recently wrote a book and this book filled the lacuna.

Dr. Subramaniam said that the assumption that various concepts of knowledge representation exist in Sanskrit is thoroughly grounded in facts, because several persons well-versed in Sanskrit have asserted the existence of the theories but he is calling it an assumption because of his lack of thorough knowledge of Sanskrit. He went on to say that many persons use the concepts with brute force techniques - for translation or sâbdabodha generation - and not worry much about formalisms. He compared this with the compiler writing styles of the early days of computer science. Compiler writing was totally lacking in formalism. Now with the advent of formal theory, both writing and testing compilers has become very easy [nearly fully automated].

Having given clues to how the formalization process can be effected, Prof. Subramanian turned to his main topic. *"I didn't want to get into this, I wanted to get into the other side which Mr. Rajan was also somewhat concerned [and] I was also concerned about. [It is the interaction] between the Sanskrit teachers, Sanskrit researchers and the researchers*

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in the computer area in institutions and colleges, etc." Reminiscing on his previous attempts toward this he said that there was a plan to invite Sanskrit scholars to deliver some lectures on [Indian] logic. Since logic is very important for AI, if this can be rewritten in predicate calculus form, it will be very useful. But it was not possible to get people do this. Prof. Subramaniam felt that this line is still worth pursuing.

Continuing on a related aspect of the same topic, he said "*Fortunately we are somewhat liberal in our outlook even though I know there are people who do not really believe in this types of activities. But there are also those who believe in this and those who do not believe don't come in the way of those who believe. There is obstructionism, but not much. So it is still open if some scholars would like to come here and deliver a series of ten or twenty lectures - whatever it is, the number is not important - and we can sit and work. It need not be only lectures, it can be discussions [etc.]"*

Prof. Subramaniam also mentioned another prime mover in this effort - the Foundation set up by Dr. Paramananda Bharati Swamiji which also aims to set up similar interaction sessions weekly or fortnightly. These plans have also not materialized so far, he added.

Having elaborated the topic of interaction between Sanskrit scholars and Computer Scientists at the scholar-expert level, Prof. Subramaniam mentioned some ways of bringing interested students to the arena. One possibility is that of a Sanskrit student spending some time in other institutions at doctoral or post-doctoral level. Many institutions have openings for such visitors. The other is that of students of computer science doing their graduate projects on ways of bridging work in Sanskrit and current formalisms. He opined that it is difficult to get doctoral students working on this but BE, BTech, or ME students - who have a project work schedule of nearly ten months - can contribute much to this exploratory work.

Dr. Subramaniam concluded his talk with an observation which corroborated his stand that interaction is lacking currently. He observed that

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not many of Bangalore's Sanskrit scholars attended the seminar. He said that many of them are involved in some kind of creative work but because of isolation, there are too many duplications. He said that he was really puzzled by the absence of young scholars in the seminar.

Dr. Saroja Bhate :

Dr. Bhate, who next came to the podium as a Sanskrit scholar after a series of computer scientists, felt a strange kind of plagiarism - that most of what she wanted to say had been aired before by other speakers! Nevertheless, she was sufficiently resourceful to add concrete ideas. She said that she felt rewarded in the company of computer scholars and that itself was a major purpose served by the seminar. Addressing the organizers of the future seminars, she said that the subjects should be identified. *"First of all the computer scientists - I feel that the receiving end is more important - should be asked to give their own requirements, their own expectations from the Sanskrit traditional pundits and what they want from the pundits."* Indicating her preference of workshops to seminars because of the former's longer duration, she continued *"And in the workshops the Sanskritists should be asked to sit down and write something for the computer scientists. May be the scholar should be asked to write in notational formation or computational model for Ashtâdyâyi, computational model for Navya Nyâya, and so on and so forth."*

Commenting on the issue of co-ordination of efforts to avoid duplications, she suggested that a database of all the computer programs, - available in India as well as the world over - in this area be established. *"I feel that, a complete bibliography of all the publications and articles in this area has got to be prepared".*

Dr. Bhate finally stressed the need for study groups and assignment of time-bound projects and the identification of future areas of research.

(Extracts from the recording)

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संस्कृतभाषायाः वैशिष्ट्यम्

के. एस्. वरदाचार्यः

संस्कृतभाषायाः वैशिष्ट्यमधिकृत्य तदा तदा, तत्र तत्र विद्वद्वरेण्यैः विविधः विमर्शः क्रियत एव। तत्रापि विशिष्य *'इयं भाषा इतरभाषापेक्षया 'कम्प्यूटर' यन्त्रस्य अनुगुणा वर्तते'* इति प्रकटनानन्तरं इयं जिज्ञासा वर्धते। इयं हि भाषा सृष्ट्या सहैवाविर्भूता यतः, अतः इयं 'Natural Language' सहजा भाषा इत्यपि कैश्चिद्वर्ण्यते। यद्यपि सर्वा अपि भाषाः सहजा एव। न हि कश्चित् कांचन भाषां स्वयं कल्पयित्वा जनानामुपरि आरोपयितुं प्रभवति। अतः सर्वा अपि भाषाः तत्तत्कक्ष्यायां सहजा एव। अथापि संस्कृतस्य सहजत्वं न तावन्मात्रेण॥

संस्कृतभाषा कदा आविर्भूता? कथमाविर्भूता? इति प्रश्नस्य उत्तरं प्रथममन्वेष्टव्यम्। आरम्भे सहजा भाषा प्राकृता असीत्, पाणिन्यादिभिर्व्याकरणादिना तस्यास्संस्कारदानात् *सा संस्कृता'* अभूत् इति केचन मन्यन्ते। परन्तु इदं न क्षोदक्षमम्। भाषाया बहुमुखाभिवृद्ध्यनन्तरमेव व्याकरणरचनायां प्रवृत्तिः स्यात्। महाभाष्यादिष्वपि *'प्रयुक्तानां शब्दनामेवान्वाख्यानम्'*वर्ण्यते। *'प्रयोगशरणा हि वैयाकरणाः'* इति किलाभाणकः। अतः प्राकृतमेव संस्कृतमभूदिति न सर्वथा युक्तम्। प्रत्युत, संस्कृतमेव क्रमशः प्राकृतमभूत् इति कथनमेव युज्येतापि॥

इदमत्रावधेयम् – *'व्याकरणम्'* इति पदं उपनिषदि श्रूयते – *'तद्धेदं तर्ह्यव्याकृतमासीत्, तन्नामरूपाभ्यां व्याक्रियत'* (बृ. उ. ३-४-७) *'नामरूपे व्याकरवाणि'* (छां. उ. ६-३-२)*'नामरूपे व्याकरोत्'* (छां. उ. ६-३-३) इति।*'नामरूपव्याकरणम्'* इति वेदान्तिनां प्रसिद्धमिदम्। *'संज्ञामूर्तिक्लृप्तिस्तु त्रिवृत्कुर्वत उपदेशात्'* (ब्र.सू. २-४-१७) इति सूत्रम् एतद्विचारार्थमेव प्रवृत्तम्। *'सर्वाणि रूपाणि विचित्य धीरः। नामानि कृत्वा अभिवदन् यदास्ते'* इति च (पु. सू.) प्रसिद्धमेव। अतश्च व्याकरणं - नामव्याकरणम्, रूपव्याकरणम् इति द्विविधम्। तत्र नामव्याकरणं प्रसिद्धम्, सर्वेऽपि जानन्त्येव। तदेव च शब्दव्याकरणम्, शब्दशास्त्रम् इति प्रसिद्धम्। रूपव्याकरणं नाम किम्?

जलानयनसाधनभूतं वस्तु चिकीर्षुः कुलालः, तदनुगुणाकरविशिष्टमेव घटादिकं करोतीति सर्वविदितम्। तद्वदेव, सृष्टिसिद्धाः ये ये आकाराः पशुपक्षिसरीसृपमनुष्यादीनाम्, ते आकाराः सृष्टिकर्त्रा, प्रकृत्या वा केनचिदुद्देशेनैव निर्मिता भवेयुः। नो चेत्, *'अस्य वस्तुनः, अस्य प्राणिनो वा आकारः एवमेव कुतोऽभवत्?'* इति प्रश्नः निरुत्तरः स्यात्॥

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यथा वा यस्य कस्य च नूतनस्य यन्त्रस्य निर्माता, तान्त्रिकः, यदुद्देशेन तं यन्त्रं सिसृक्षति, तदुद्देशानुगुणमेव तेन तस्याकारः करणीयो भवेत्। परिभ्रमणकार्यार्थं क्रियमाणं हि चक्रं तदनुगुणं वर्तुलाकारमेव हि भवेत्, न तु चतुरश्राकारम्। एवमेव एतज्जगत्स्रष्टा वा, प्रकृतिर्वा स्वोद्देशानुगुणाकार-विशिष्टमेव किल वस्तूनि सृजेत्। अतश्च वस्तूनां रूपकरणमेव *'रूपव्याकरणम्'* । रूपो नाम आकारः। ब्रह्मसूत्रे हि *'नामरूपव्याकरणम्'* इत्येतस्मिन्नर्थे *'संज्ञामूर्तिक्लृप्तिः'* इति दृश्यते । तत्र संज्ञाक्लृप्तिः = नामव्याकरणम्। मूर्तिक्लृप्तिः = रूपव्याकरणम् । क्लृप्तिः = कल्पनम् सृष्टिः। *'धाता यथापूर्वमकल्पयत्'* (नारा. १-३८) इत्यत्र कल्पनं = सृष्टिः इति सम्प्रतिपन्नम्॥

एवं च एतज्जगत्स्रष्टा, एतद्वस्तूनां सृष्टिसमय एव तत्तदुद्देशानुगुणं रूपम्, नाम च स्वयमेव कृतवान्, करोति वा – इत्येव नामरूपव्याकरणपदार्थः। अत एव नामरूपव्याकरणमेव सृष्टिपदार्थः इति वेदान्तिभिरुच्यते। अनेन ज्ञायते – सृष्टिसहजसिद्धानां वस्तूनाम् आकारेण साकमेव नाम्नोऽपि सृष्टिर्भवति। उभयमपि समानकालिकमेव। तत्र नाम = संस्कृतनामपदमेव । एतानि च पदानि तत्तन्निर्वचनेनैव तत्तदर्थवाचकानि भवन्तीत्यपि सर्वविदितम्। यथा *'देवः'* इति पदं *'दिवुक्रीडाविजिगीषा'* इत्यर्थकधातुतो निष्पन्नम् इति शब्दव्याकरणं वर्ण्यते, तथैव क्रीडादिव्यापारानुगुण एव कश्चन आकारोऽपि देवस्य सिद्ध्यति॥

एवं रीत्या संस्कृतपदानि सर्वाण्यपि कारणजन्यानि। *'सर्वं धातुजमाह पाणिनिः'* इति किल श्रूयते। अत एव *'भू'* इत्यादीनां *'धातुः'* इति नाम। धातुर्नाम मूलकारणं वस्तु। अतः संस्कृतभाषायां, तत्तत्पदानि, तत्तन्निर्वचनेनैव तत्तदर्थवाचकानि ज्ञातुं शक्यन्ते। यथा – देववाचकानि *'अमरा निर्जरादेवाः त्रिदशाः'* – इत्यादीनि पदानि, यदा निरुच्यन्ते, तदैव देवानां स्वरूपस्वभावादिपरिचयोऽपि तेनैव भवत्यस्माकम्। एवमेकैकस्य वस्तुनः अनेकधर्मखचितत्वादेव, संस्कृतभाषायां एकस्य वस्तुनः अनेके पर्यायशब्दाः प्रवृत्ताः। एतेषां परिशीलनेन तत्तद्वस्तूनां स्थानमानप्रयोजनादिकं सर्वं ज्ञातुं शक्येत। अत एव चेयं संस्कृता भाषा सहजा = सृष्टिसहजाभाषा। तेन च सृष्टिविज्ञानं सर्वमप्यस्माकं परिचितं भवति स्वयमेव। तेन चैतेषां वर्गीकरणादिकमपि सुलभम्, असंकीर्णं च भवितुमर्हति। अत एव *'कम्प्यूटर्'* यन्त्रे इतरभाषापेक्षया अस्या आनुगुण्यातिशयोऽपि युक्त एव॥

किं च – भाषायां प्रधानो विषयः – *'स्वरः'* । भाषा किल अभिप्रायप्रकटनसाधनम्। एकस्यैव पदस्य विविधस्वरयुक्ततयोच्चारणे अर्थभेदः प्रसिद्धः। व्याध्यादिपीडितस्य वेदनासूचको यो ध्वनिः *'हुम्'* इत्यादिरूपः, तस्य श्रवणेन किल व्याधेः स्वरूपपरिमाणादिकं ज्ञातुं शक्यते। आनन्दवर्धनादिभिः प्रतिपादितः *'ध्वनि'* वादः एतन्मूलक एव किल। अत एव तस्य *'ध्वनिः'* इत्येव नाम कृतम्। अतश्च अभिप्रायाविष्करणे ध्वनेः = स्वरविशेषस्य स्थानं महत्तरमेव। संस्कृतभाषायां किल वर्णानाम्, पदानाम्, वाक्यानां च स्वरविशेषाः वर्ण्यन्ते। *'इन्द्रशत्रु'* पदे हि, तत्पुरुष-बहुव्रीहिसमासभेदेन स्वरभेदः अर्थभेदश्च प्रसिद्धः। *'पुरुष एवेदँ सर्वम्'* इति पुरुषसूक्तवाक्ये दकारः उदात्त एव पठनीयः। अनुदात्तस्वरकथने,

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निर्दिष्टवस्तुन एव पुरुषात्मकत्वं लभ्यते; न तु सर्वस्य। अतः संस्कृतभाषायां स्वरः अत्यन्तं प्रधानम्। *वर्णक्रम'* प्रभृतिषु इदं व्यक्तं वैदिकानाम् ॥

एतादृशविषयाणां सर्वेषां सावधानाध्ययनेन हि अस्या वैशिष्ट्यमसाधारणं ज्ञायेत । तेन च अर्थाभिव्यक्तौ स्पष्टता, असांकर्यम् इत्यादयो लाभाः सुलभा अस्यां भाषायाम् ॥

वेदवाङ्मये तु इदं सर्वमपि स्पष्टं निरूपयितुं शक्यम् । एवं सृष्ट्या साकमेवाविर्भावात् वर्धनाच्च इयं भाषा न पुरुषसृष्टा, किन्तु दैवी वाक् । अत एव च देवभाषेयम् । अत एव च नैकस्य समाजस्य, देशस्य वा इयं भाषा परिमिता गण्यते। देवा यथा सर्वेषां समानाः तद्वदेवेयमपि ॥

अत एवेयं भाषा न *'मृतभाषा'* । न हि एकस्या भाषायाः, एकेन समाजेन, देशेन, कालेन वा सीमितत्वमात्रात्, अन्यदेशकालादावनुपयोगमात्राच्च मृतत्वं वक्तुं शक्यम् । तदा हि लौकिकी भाषा, परिमितदेशकालसमाजमात्रसम्बन्धिनी *'मृता'* भवेत् । अतः संस्कृतं देवभाषा, अमराणां भाषा । सा कदापि न मरिष्यति जनानां दौर्भाग्यवशात्, किंचिदिव मलिनेव कदाचित् भायात् । परन्तु समयविशेषे सा पुनरुन्मिषिता विजृम्भेदेव न संशयः। एतत्सर्वं परिशीलने भारतीयानाम्, विशिष्य संस्कृतविदुषां भारः महानेव। तं वोढुं तदनुगुणशक्तिसामर्थ्यादिकमनुगृह्णात्वस्माकं सैव देवी वाणी ॥

(लेखकप्रदत्तं लेखनम्)

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शाब्दबोधे मुख्यविशेष्यः

एन्. एस्. रामानुजताताचार्यः

शाब्दबोधो नाम शब्दजन्यं ज्ञानम् । शब्दो नाम परस्परान्वितार्थप्रतिपादकपदसमूहात्मकं वाक्यम् । *'आप्तवाक्यं शब्द'* इति ह्याहुः । पदसमूहो वाक्यमित्येतावन्मात्रोक्तौ *'गौरश्वः पुरुषो हस्ती'* इत्यादेः अनन्वितार्थक पदसमूहस्यापि वाक्यत्वं स्यात् । अतः परस्परान्वितार्थकेत्युक्तम् ।

'गौर्गच्छति', *'अश्वो धावति'* इत्यनयोः वाक्यत्वेऽपि तयोर्द्वयोः मिलित्वा एकवाक्यत्वं न भवति, द्वयोः वाक्यार्थयोः परस्परमनन्वयात् । तस्मात् साक्षाद्वा परम्परया वा स्वार्थविशेषणीभूतार्थ-प्रतिपादकयावत्पदविशिष्टं विशेष्यभूतार्थप्रतिपादकं पदमेकवाक्यमिति पर्यवस्यति ॥

इदमेव *'अर्थैकत्वादेकं वाक्यं साकाङ्क्षं चेद्विभागे स्यात्'* इति पूर्वमीमांसाशास्त्रे (२-१-४६) उक्तम् । एकस्मिन्नर्थे अन्येषां विशेषणतया अन्वय इत्येतत्सूचनायैव *'साकाङ्क्षं चेद्विभागे स्यात्'* इत्युक्तम् ।

न च *'गावो धावन्ति'* इत्यत्र गोपदोपस्थाप्यनाम् अनेकासां गवां विशेष्यत्वात् एकविशेष्यकत्वं नास्तीति कथमेकवाक्यत्वमिति वाच्यम्; एकविशेष्यकेत्यस्य एकपदोपस्थाप्य-विशेष्यकेत्यर्थात् । अथवा एकधर्मावच्छिन्नविशेष्यकेत्यर्थः । गावो धावन्तीत्यत्र अनेक गोविशेष्यकस्यापि बोधस्य एकगोत्वावच्छिन्नविशेष्यकत्वमस्तीति न दोषः । *'देवदत्तयज्ञदत्तौ गच्छतः'* इत्यत्र द्वित्वविशिष्टयोरेव देवदत्तयज्ञदत्तयोः विशेष्यत्वात् तादृशवाक्यजन्यबोधस्य एकधर्मावच्छिन्न विशेष्यकत्वम् अस्तीत्येकवाक्यत्वमुपपद्यते ॥

न चैवमपि *'देवदत्तः शुक्लां गां ददाति'* इत्यत्र देवदत्तस्य क्रियां प्रतीव गोः शुक्लत्वं प्रति विशेष्यत्वात् एकविशेष्यक बोधजनकत्वाभावात् कथं तस्यैकवाक्यत्वमिति वाच्यम् । एक मुख्यविशेष्यक बोधजनकत्वमेक वाक्यत्वमिति विवक्षितत्वात् । प्रदर्शितवाक्यजन्यबोधे देवदत्त एक एव मुख्यविशेष्य इति नानुपपत्तिः । मुख्यविशेष्यत्वं च इतराविशेष्यत्वे सति विशेष्यत्वम् । शुक्लगुणं प्रति विशेष्यस्य गोः क्रियां प्रति विशेषणत्वात् न मुख्यविशेष्यत्वम् ॥

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तत्र पदेषु बहुषु प्रयुज्यमानेषु कस्य किं विशेषणम् ? किं किं अवान्तर विशेष्यम् ? किं मुख्य विशेष्यं इति विचारणीयं भवति । तत्र वैयाकरणाः मीमांसकाः नैयायिकाश्च भिन्नं भिन्नं पन्थानमाश्रयन्ते ॥

वैयाकरणमतम्

तथाहि – वैयाकरणास्तावत् एवं मन्यन्ते – कारकाणां क्रियायामन्वय इत्यनुभवात् क्रियापदे प्रायः सुबन्तानामन्वय इति ज्ञायते। *'नीलोत्पलमानयति'* इत्यत्र समासार्थस्य नीलत्वविशिष्टोत्पलस्य द्वितीयार्थे कर्मणि, तस्य धात्वर्थे आनयनेऽन्वय इति नीलत्वविशिष्टोत्पलकर्मकमानयनमिति बोधो भवति । तथैव *'नीलमुत्पलमानय'* इति व्यासस्थलेऽपि नीलकर्मकमानयनम् उत्पलकर्मकमानयनमिति पृथक् पृथक् बोधस्य अननुभवात् द्विः कर्मत्वभानं विहाय समानाधिकरणयोः नीलोत्पलपदयोः नीलत्वविशिष्टोत्पलरूपैकार्थपरत्वम् अङ्गीकृत्य तस्य धात्वर्थे आनयने द्वितीयार्थकर्मत्वद्वारा अन्वयस्वीकारात् नीलत्वविशिष्टोत्पलकर्मकमानयनमित्येव बोधः । एवं च सविशेषणानां विशेषणरहितानां वा कर्त्रतिरिक्तानां सर्वेषां कारकाणां धात्वर्थक्रियान्वयस्य नैयायिकादिभिरपि स्वीकृतत्वात् प्रथमान्तार्थस्य कर्तृकारकस्यापि तत्रैवान्वय उचितः, समानन्यायात् । तथा च *'देवदत्तः नीलोत्पलमानयति'* इत्यत्र द्वितीयार्थः कर्म, तत्र प्रकृत्यर्थस्य नीलत्वविशिष्टोत्पलस्य अभेदसम्बन्धेनान्वयः। कर्मणः धात्वर्थेऽन्वयः। तिङः कर्ता अर्थः। तत्राभेदसम्बन्धेन प्रथमान्तपदार्थस्य देवदत्तस्यान्वयः। कर्तुरपि धात्वर्थे आनयने अन्वयः। तथा च नीलत्वविशिष्टोत्पलाभिन्नकर्मकं देवदत्ताभिन्नकर्तृकं चानयनमिति धात्वर्थमुख्यविशेष्यको बोधः ॥

अत्र विषये प्रमाणमुपपत्तिं च ब्रूमः – निरुक्तकारः *'चत्वारि पदजातानि नामाख्यातोपसर्गनिपाताः'* इत्युपक्रम्य *'सत्त्वप्रधानानि नामानि'* इति नामलक्षणम्, *'भाव प्रधानमाख्यातम्'* इति आख्यतलक्षणं च निरूपयति। *'प्रकृतिः प्रत्ययो विभक्तिरित्येतावत् नाम, सत्ता द्रव्यं लिङ्गं संख्येति नामार्थः'* इति निरुक्तभाष्यात् सुबन्तं नामपदेन विवक्षितम्। एवमाख्यातशब्देन तिङन्तमुच्यते। *'आख्यातमाख्यातेन क्रियासातत्ये'* इति कात्यायनवार्तिके आख्यातशब्देन तिङन्तस्यैव बोधनात्। *'सर्वमाख्यातजं नाम'* इत्यत्र तु आख्यातशब्दः लक्षणया तिङन्तैकदेशं धातुमाचष्टे। न्यायवार्तिक कारोऽपि *'ते विभक्त्यन्ताः पदम्'* (न्या. सू. २-२-५७) इति सूत्रव्याख्यानावसरे *'द्वयी विभक्तिः स्वादयः तिबादयश्च। तत्र स्वाद्यन्तं नाम, तिबाद्यन्तमाख्यातम्'* इति स्पष्टमभिदधे। एवं चाख्यातेन तिङन्तेन चत्वारोऽर्था उच्यन्ते भावः, कालः, कारकं, संख्या चेति। तत्र भावः धातुना उच्यते, कालः कारकं संख्याः तिङा इति विवेकः। तेषु चतुर्ष्वर्थेषु कः शाब्दबोधे विशेष्यतया भासत इति जिज्ञासायामुक्तं – भावप्रधानमाख्यातमिति। भावो नाम धात्वर्थो व्यापारः, तद्विशेष्यक बोधजनकं तिङन्तमिति निरुक्तवचनस्यार्थः। स्पष्टमुक्तं चेदं निरुक्तभाष्ये – *'भावकालकारक संख्याः चत्वारोऽर्था आख्यातस्य। तेषु भावः प्रधानम्'* इति। तेन कालकारकसंख्याविशेषणकभाव विशेष्यकबोध जनकत्व माख्यातस्येति लभ्यते ॥

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यद्यपि *'प्रकृत्यर्थापेक्षया प्रत्ययार्थस्य प्राधान्यम्'* इति न्यायविरोधात् कथं प्रकृत्यर्थस्य भावस्य प्राधान्यमिति शङ्का अवतरति, तथापि भावप्रधानमाख्यातमिति विशेषस्मृतिवचनबलात् प्रत्ययार्थप्राधान्यविषयको न्यायः सुबर्थविषयकतया सङ्कोचनीयः। सुबर्थो हि कर्मत्वादिः प्रकृत्यर्थापेक्षया प्रधानो भवतीति। किं च *'चैत्रेण सुप्यते'* इत्यादि भावाख्यातस्थले धात्वर्थस्यैव प्राधान्यात् प्रत्ययार्थप्राधान्यन्यायो न सार्वत्रिकः॥

अपि च *'क्रिया प्रधानमाख्यातम्'* इति महाभाष्यमपि धात्वर्थमुख्यविशेष्यक बोधे प्रमाणम्। न्यायभाष्यकारोऽपि पंचमाध्याये *'प्रकृतादर्थादसम्बद्धमर्थान्तरम्'* (5.2.7) इति सूत्रे *'क्रिया कालयोगाभिधायि आख्यातम्, धात्वर्थमात्रं च कालाभिधानविशिष्टम्'* इत्यभाषिष्ट। कालेन अभिधानेन कारकेण च विशिष्टं धात्वर्थमात्रमाख्यातार्थ इति तदर्थः। तेन च भाष्येण स्पष्टमेवावगम्यते यत् कालकारकान्वितो धात्वर्थ एव आख्यातजन्यबोधे मुख्यविशेष्य इति। न्यायवार्तिककारश्च *'ते विभक्त्यन्ताः पदम्'* इति सूत्रव्याख्यानावसरे - *'क्रियाकालयोगाभिधायि क्रियाप्रधानमाख्यातम् यथा पचतीति'* इति वदन् क्रियाप्राधान्यं मन्यते। एवं च प्राचीननैयायिकानामपि क्रियामुख्यविशेष्यकबोध एव सम्मतः॥

ननु पूर्वोक्तैः वचनैः यत्र तिङन्तमात्रं प्रयुज्यते तत्र एकाभिन्नकर्तृविशिष्टो व्यापारः इत्याकारको भावविशेष्यको बोधो भवतीत्येतावन्मात्रमवगम्यते। यत्र तिङन्तेन साकं प्रथमान्तमपि प्रयुक्तं तत्र *'देवदत्तः पचति'* इत्यत्र पाककर्त्रभिन्नो देवदत्त इति प्रथमान्तार्थमुख्यविशेष्यक एव बोधोऽस्त्विति चेत् - अत्रोच्यते - तत्रैव निरुक्ते *'यत्रोभे भावप्रधाने भवतः'* इत्यनन्तरवाक्यात् प्रथमान्तपदसमभिव्याहृततिङन्तादपि धात्वर्थक्रियाविशेष्यकबोधस्यैव सूचितत्वात्। यत्र सुबन्त तिङन्ते प्रयुज्येते पृथक् पृथक्, तत्र सत्त्वप्रधानं नाम, भावप्रधानमाख्यातम्। यत्रत्वेकस्मिन् वाक्ये सुबन्तं तिङन्तं च उभयं प्रयुज्यते, तत्र कस्य प्राधान्यमिति जिज्ञासायामिदं वाक्यमवतीर्णं - *'यत्रोभे'* इति। यत्र वाक्ये उभे नामाख्याते भवतः तत्र ते द्वे अपि भावप्रधाने इत्यर्थः। तथा च प्रथमान्तपदसमभिव्याहारस्थलेऽपि धात्वर्थस्यैव प्राधान्यं मन्यते निरुक्तकारः॥

अपि च धात्वर्थक्रियाविशेषणक प्रथमान्तार्थ मुख्यविशेष्यको बोधो यद्यङ्गीक्रियेत, तदा *'पश्य मृगो धावति'* इत्यत्र *'तिङ्ङतिङः'* (पा. सू. 8.1.28) इति सूत्रस्य महाभाष्यसम्मता एकवाक्यता न स्यात्। धावति मृग इत्यतो धावनानुकूल कृतिमान् मृग इति बोधः, पश्येत्यतो दर्शनाश्रयस्त्वम् इति बोधश्च वाच्य इति वाक्यार्थस्य भिन्नत्वात् एकमुख्यविशेष्यक बोधजनकत्वरूपमेकवाक्यत्वं न निर्वहति। न च धावनानुकूलकृतिमन्मृगस्य कर्मतासम्बन्धेन धात्वर्थे दर्शनेऽन्वयः। तस्य चाश्रयता सम्बन्धेन त्वं पदार्थेऽन्वय इति धावनानुकूलकृतिमन्मृगकर्मकदर्शनाश्रयस्त्वमित्याकारकस्य एकमुख्यविशेष्यकस्य बोधस्य जननात् एकवाक्यत्वमुपपद्यत इति वाच्यम्। नामार्थधात्वर्थयोः भेदेनान्वयस्य अव्युत्पन्नतया कर्मत्वसम्बन्धेन मृगस्य दर्शनेऽन्वयासम्भवात्। अन्यथा कर्मत्वसम्बन्धेन तण्डुलस्य पाकेऽन्वय विवक्षया *'तण्डुलः पचति'* इति वाक्यस्यापि साधुतापत्तेः। अतः कर्मत्वस्य सम्बन्धविधया भानासम्भवात् प्रकारविधयैव भानं वक्तव्यमिति मृगपदोत्तरं कर्मत्वार्थकद्वितीयाविभक्तिः प्रसज्यते॥

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वैयाकरणमते तु *'मृगो धावति'* इत्यतो मृगकर्तृकं धावनं बोध्यते । तस्य कर्मतासम्बन्धेन दर्शनक्रियायामन्वयः। तथा च मृगकर्तृकधावनकर्मकं दर्शनमिति बोधो भवति। अत्र न कोपि व्युत्पत्तिविरोधो लक्ष्यते। दर्शनरूपैकमुख्यविशेष्यकबोधजनकत्वात् भाष्यसिद्धमेकवाक्यत्वं चोपपन्नं भवति ॥

मीमांसकमतम्

मीमांसकास्तु - तिङर्थभावनामुख्यविशेष्यकं बोधं वर्णयन्ति । तथाहि - तण्डुलमित्यादीनि द्वितीयान्तानि पदानि क्रियापदं विना निराकाङ्क्षं बोधं न जनयन्तीत्यनुभवसिद्धम् । तेन तिङन्तपदं विशेष्यसमर्पकमिति लभ्यते । तत्रापि *'प्रकृतिप्रत्ययौ प्रत्ययार्थं सह ब्रूतः , तयोस्तु प्रत्ययः प्राधान्येन'* इति व्युत्पत्तिबलात् प्रत्ययार्थस्यैव प्राधान्यं वक्तव्यमिति तिङर्थः भावनापरपर्याया कृतिरेव शाब्दबोधे मुख्यविशेष्यभूता ॥

एवं *'चैत्रस्तण्डुलं पचति'* इति वाक्ये द्वितीयायाः कर्मत्वमर्थः । तत्र तण्डुलस्याधेयता-सम्बन्धेनान्वयः। कर्मत्वस्य निरूपकतासम्बन्धेन (स्वनिरूपकधात्वर्थानुकूलत्वपर्यवसितेन) तिङर्थकृतावन्वयः। धात्वर्थस्य पाकस्य स्वकरणकौदनोद्देश्यकत्वसम्बन्धेन कृतावन्वयः। चैत्रपदोत्तर प्रथमायाः *'प्रातिपदिकार्थलिङ्गपरिणामवचनमात्रे प्रथमा'* (पा. सु. 2.3.46) इति सूत्रानुसारात् प्रातिपदिकार्थः चैत्रोऽर्थः । चैत्रपदं तात्पर्यग्राहकम् । प्रथमार्थस्य चैत्रस्य आधेय सम्बन्धेन भावनायामन्वयः । आख्यातार्थकालसंख्ययोरपि भावनायामेवान्वयः । संख्यायाः सामानाधिकरण्यसम्बन्धेन अन्वयः । कालस्याधेयतासम्बन्धेनान्वय इति विशेषः। एवं च चैत्रनिष्ठा तण्डुलकर्मक पाककरणकौदनोद्देश्यिका वर्तमाना एका भावना इति बोधः। *'भावप्रधानमाख्यातम्'* इति निरुक्ते आख्यातशब्दः तिङ्परः। भावयतीति व्युत्पत्त्या णिजन्तात् भूधातोरच्प्रत्ययान्तत्वेन निष्पन्नो भावशब्दो भावनावाची । तिङश्च संख्या कालः भावनेति त्रयोऽर्थाः। तेषु भावना प्रधानभूतेति भावनामुख्यविशेष्यकबोधमेव निरुक्तकारो मन्यत इति ॥

नैयायिकमतम्

पण्डितः चैत्रः इति वाक्यात् पण्डिताभिन्नः चैत्रः इति बोधोऽनुभूयते। तत्र तिङन्तपदाभावात् धात्वर्थस्य वा तिङर्थभावनाया वा मुख्यविशेष्यतया भानं न सम्भवति । तथा च क्वचित् प्रथमान्तार्थमुख्यविशेष्यकबोधस्य स्वीकरणीयतया तिङन्तसमभिव्याहारस्थलेऽपि तथैव वर्णनं युक्तम्। दृश्यन्ते च बहुलं तिङन्तरहिताः प्रयोगाः-

शशी दिवसधूसरो विगतयौवना कामिनी सरो विगतवारिजं मुखमनक्षरं स्वाकृतेः।
प्रभुर्धनपरायणः सततदुर्गतः सज्जनः नृपाङ्गणगतः खलः मनसि सप्तशल्यानि मे॥ इत्यादयः।

न च तत्रापि योग्यक्रियाध्याहारेणैव शाब्दबोध इति वाच्यम् । अनध्याहारेणैव निर्वाहे अध्याहारस्यायुक्तत्वात्। अपि च वैयाकरणभूषणे *'प्रायशो वाक्यस्य सुप्तिङन्तसमुदायत्वात् सुबन्तानां च*

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प्रायः *क्रियाविशेषणत्वात्'* इति वदन्तः कौण्डभट्टाः तिङन्तशून्यमपि वाक्यमभ्युपगच्छन्ति । तथा आख्यातार्थव्यापाराश्रयत्वरूपस्य कर्तृत्वस्य निराकरणावसरे *'आख्यातशून्ये देवदत्तः पक्ता इत्यादौ देवदत्तस्याकर्तृत्वापत्तेः'* इति भूषणसारे अपि तिङन्तरहितवाक्यप्रामाण्याङ्गीकारः प्रतीयते । अपिच *'चैत्रेण शयितव्यति'* इति सुबन्तचयात्मकं वाक्यमपीष्यते वैयाकरणैः । अत एव *'सुप्तिङन्तचयो वाक्यम्'* इत्यस्य सुबन्तचयः, तिङन्तचयः, सुप्तिङन्तचयः इति *मंजूषायां* विवरणं कृतम् । एवं च तिङन्तासमभिव्याहारस्थले प्रथमान्तार्थविशेष्यकबोधस्य स्वीकार्यत्वात् *'चैत्रः पचति'* इत्यादावपि तथैव बोधवर्णनं युक्तम् । एवं च *'चैत्रस्तण्डुलं पचतीति'* वाक्ये तण्डुलपदोत्तरद्वितीयायाः कर्मत्वमर्थः । कर्मत्वे प्रकृत्यर्थस्य तण्डुलस्य आधेयतासम्बन्धेनान्वयः । कर्मत्वस्य निरूपकतासम्बन्धेन धात्वर्थे पाकेऽन्वयः । आख्यातार्थः कृतिः । तत्रानुकूलतासम्बन्धेन धात्वर्थपाकस्यान्वयः । कृतेश्च आश्रयतासम्बन्धेन प्रथमान्तार्थे चैत्रेऽन्वयः । वर्तमानकालस्याख्यातार्थस्य कृतावेवान्वयः । आख्यातैकवचनस्य तु नैकत्व संख्याऽर्थः । सुबेकवचनेनैव एकत्वलाभात् । तथा च तण्डुलनिष्ठ कर्मतानिरूपक पाकानुकूल वर्तमान कृतिमान् एकः चैत्र इति बोधः ॥

किं च *'सर्वनाम्नामुत्सर्गतः प्रधानपरामर्शित्वम्'* इति न्यायात् पूर्ववाक्यार्थे यः प्रधानं तस्यैव तच्छब्देन परामर्शो वक्तव्यः । धात्वर्थमुख्यविशेष्यकस्य आख्यातार्थकृतिमुख्यविशेष्यकस्य वा बोधस्याङ्गीकारे *'पुरुषः प्रयाति तस्य पादयोरभिवादय'* इत्यत्रानुपपत्तिः । तथाहि - पुरुषः प्रयातीति वाक्ये प्रधानस्य गमनस्य कृतेर्वा तच्छब्देन परामर्शे *पादयोरभिवादय* इत्यनेनान्वयानुपपत्तिः । नैयायिकमते तु पुरुषस्यैव प्रधानतया तस्य तच्छब्देन परामर्शे पादयोरभिवादयेत्यनेनान्वयः साधुसङ्गच्छते ॥

एवं *'व्याकरणमधीते वेत्ति वा'* इत्यर्थे *'तदधीते तद्वेद'* इति सूत्रेणाण् प्रत्यये वैयाकरण शब्दः निष्पद्यते । तत्र वैयाकरणशब्दात् व्याकरणाध्येता इति बोधो भवति । तत्समानार्थकात् व्याकरणमधीत इति वाक्यादपि व्याकरणाध्येता इति बोध एवोचित इति प्रथमान्तार्थमुख्यविशेष्यकबोधः पाणिनिसम्मतश्च । *न्यायकुसुमांजलौ* पंचमस्तबके उदयनाचार्यैः *'न हि अन्यतराकाङ्क्षा अन्वयहेतुः, अपितु उभयाकाङ्क्षा । प्रातिपदिकार्थो हि फलेनान्वयमलभमानः क्रियासम्बन्धमपेक्षते । भावनापि व्यापारभूता सती व्यापारिणमित्युभयाकाङ्क्षा अन्वयहेतुः । अत एवानुभवोऽपि यावदुक्तं भाति पाकानुकूलवर्तमानयत्नवानिति तावदुक्तं भवति पचतीति'* इति वदद्भिः प्रथमान्तार्थप्राधान्यं सूचितम् ॥

यत्तु *'भावप्रधानमाख्यातम्'* इति निरुक्तवचनमुदाहृतम्, तदपि आख्यातार्थेषु भावनाकाल-संख्यासु कस्य प्राधान्यं कस्य वा गौणत्वमिति जिज्ञासायां भावनायाः कृतेः प्राधान्यमिति वदति । एवं च तद्वचनं भावनायाः भावनेतराख्यातार्थनिष्ठप्रकारतानिरूपितविशेष्यत्वाख्यं प्राधान्यमेव बोधयति । ननु प्रथमान्तार्थनिष्ठप्रकारतानिरूपितविशेष्यत्वमपि बोधयतीति न तद्वचनं बोधस्य प्रथमान्तर्थमुख्यविशेष्यकत्वे बाधकम् । *'यत्रोभे भावप्रधाने भवतः'* इति वाक्येनापि भावनायाः इतरकारकापेक्षया आर्थिकं प्राधान्यमेव बोध्यते, कारकाणां भावनिष्पत्त्यङ्गत्वात् इति न तद्विरोधः ॥

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यदुक्तं नैयायिकमते *'पश्य मृगो धावति'* इत्यत्र एकवाक्यत्वानुपपत्तिरिति, तत्र त्रेधा निर्वाह उच्यते - उक्तस्थले नैयायिकैरपि वैयाकरणमतरीत्या मृगकर्तृकधावनकर्मकं दर्शनमिति बोधस्यैव स्वीकारात्। न हि सर्वत्र प्रथमान्तार्थमुख्यविशेष्यक एव बोध इति नियमः।

उक्तं हि गदाधरभट्टाचार्यैः व्युत्पत्तिवादे - *'अत एव यत्र विशेष्यवाचक समान विभक्तिकपदं निपातपदं वा नास्ति, तत्र प्रथमान्तार्थस्य विशेषभासकसामग्र्यभावात् असौ मुख्यविशेष्यतयैव भासते'* इति।

'चैत्रः' इत्यादौ समानविभक्तिकपदान्तरासत्त्वे प्रथमान्तार्थस्य चैत्रादेः यद्विशेष्यं तद्भासकसामग्र्यभावात् असौ प्रथमान्तार्थः चैत्रादिः विशेष्यतयैव भासत इति तदर्थः। एतेन *'चैत्रः'* इत्यादौ एकत्वप्रकारकचैत्रमुख्यविशेष्यकबोधात् सति सम्भवे अन्यत्रापि तथैव बोधः। सति सम्भवे इति कथनात् *'पचति'* इत्यतः पाकानुकूला कृतिरिति कृतिमुख्यविशेष्यकस्य बोधस्य नैयायिकैः स्वीकारात् क्वचित् प्रथमान्तार्थस्य मुख्यविशेष्यत्वाभावेऽपि न क्षतिरिति गम्यते। तेनैव न्यायेन *'पश्य मृगो धावति'* इत्यत्रापि बोधस्य धात्वर्थविशेष्यकत्वमिति प्रथमो निर्वाहः॥

'पश्य मृगो धावति' इत्यत्र इतिपदं त्वम्पदं चाध्याह्रियते। मृगो धावतीति त्वं पश्य इत्यन्वयः। इतिशब्देन कर्मण उक्तत्वान्न द्वितीयाप्रसक्तिः। तिङ्कृत्तद्धितनिपातादिभिरनभिहिते कर्मण्येव द्वितीयाविधानात्। तथा च धावनानुकूलकृतिमन्मृगकर्मकदर्शनाश्रयस्त्वमित्येव बोध इति द्वितीयो निर्वाहः॥

अथवा इतिपदाध्याहारो नावश्यकः। यत्र पदार्थस्य कर्मत्वं तत्रैव द्वितीयाप्रसक्तिः, यथा *'तण्डुलं पचति'* इत्यादौ। अत्र तु धावनानुकूलकृतिमन्मृगरूपस्य वाक्यार्थस्य कर्मत्वात् न द्वितीयाप्रसक्तिः, वाक्यस्य प्रातिपदिकसंज्ञाविरहात्। अत एव *'जानामि सीता जनकप्रसूता'* इत्यादयः प्रयोगा अप्युपपद्यन्ते॥

अपि च *'आनय गौर्धावति'* इत्यादौ वैयाकरणमते अनुपपत्तिः, गोकर्तृकधावनकर्मकमानयनमिति बोधस्यासम्भवात्। धावनानुकूलकृतिमद्गोकर्मकमानयनमित्येव वक्तव्यत्वात्। गौर्धावतीत्यतः प्रथमान्तार्थमुख्यविशेष्यकबोधस्यैव तैः स्वीकार्यत्वात्॥

एवंच तत्र तत्र यथायोग्यं यथानुभवं च बोधः स्वीकरणीयः। प्रथमान्तार्थमुख्यविशेष्यको बोध इत्युत्सर्गः। तत्र सति बाधके धात्वर्थादिमुख्यविशेष्यकोऽपि बोधः इति नैयायिकानां सिद्धान्तः॥

भूषणकारैरपि सूचितमिदम् — *'उत्सर्गोऽयम्। विशेष्यत्वादिना बोधस्तु तथा व्युत्पत्त्यनुरोधात्। अत एव नैयायिकानां प्रथमान्तविशेष्यक एव बोधः। अत एव 'प्रधानप्रत्ययार्थवचनमर्थस्यान्यप्रमाणत्वात्' (1-2-56) इति भगवान् पाणिनिः। प्रधानं प्रत्ययस्यार्थ इति वचनं न कार्यम्*

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अर्थस्य तथा बोधस्य अन्यप्रमाणत्वात् व्युत्पत्त्यनुसारित्वादिति तदर्थः' इति वदद्भिः। अतः स्पष्टमिदं यत् तत्तद्विशेष्यकबोधे वचनं नापेक्षितम्। अपि तु अनुभवानुसारि व्युत्पत्तिबलान्निर्णेयमिति ॥

किं च प्रत्यक्षानुभवे यस्य येन सम्बन्धः प्रतीतः तस्य तेन सम्बन्धं तथैव ज्ञापयितुं वाक्यं प्रयुज्यते। प्रत्यक्षेण कारकाणां क्रियान्वय एवावगम्यते न तु कृत्यपरपर्यायभावनान्वयः। अतः मीमांसकमतं नोचितम्। नापि वैयाकरणमतम्। प्रत्यक्षे धर्मस्य प्रकारतायाः धर्मिणो विशेष्यतायाश्च अनुभवसिद्धतया धर्मभूतधात्वर्थापेक्षया धर्मिणः प्रथमान्तार्थस्यैव विशेष्यत्वौचित्यात्। तत्रापि प्रकृतिप्रत्ययार्थयोर्मध्ये प्रत्ययार्थस्य प्रधानत्वात् तिङ्वाच्यायाः कृतेः धात्वर्थं प्रति विशेष्यत्वात् तादृशकृत्याश्रयस्य देवदत्तादेः विशेष्यत्वमुचितम्। सकलकर्मादिकारकप्रेरकस्य क्रियाकर्तुः सर्वापेक्षया प्राधान्यं हि आनुभाविकम् ॥

अपि च पाणिनिः *'प्रातिपदिकार्थ'* इत्यादिना सूत्रेण प्रथमायाः प्रातिपदिकार्थ एवार्थ इति वदन् कारकार्थत्वं नानुमन्यते। तेन प्रथमान्तार्थस्य क्रियायामन्वयो नानुमनुत इति स्पष्टम्। कारकार्थत्वे हि क्रियान्वयमूलकक्रियाप्रधानकत्वनिर्बन्धः। तस्मात् प्रथमान्तार्थविशेष्यकबोध एवासति बाधके उचित इति नैयायिक सिद्धान्तसारः ॥

नूतनमताविष्कारः

एवमेतावता धात्वर्थमुख्यविशेष्यको बोधः, आख्यातार्थभावनामुख्यविशेष्यको बोधः, प्रथमान्तार्थ-मुख्यविशेष्यको बोधः इति प्रकारत्रयं क्रमशो वैयाकरण - मीमांसक - नैयायिक मतसिद्धमधिकृत्य परिशीलनमकार्ष्म ॥

अथ आख्यातार्थकर्तृकर्ममुख्यविशेष्यको बोध इति चतुर्थं प्रकारं अद्ययावत् बोध - ग्रन्थेष्वनुदृङ्कितं श्रीमन्निगमान्तमहादेशिकग्रन्थपरिशीलनेनावगतं विदुषां पुरतो निवेदयामि। *न्यायपरिशुद्धि* नामके ग्रन्थे तैः - *'प्रतिपत्तिप्रकारस्तु यजेतेत्यादौ स्वव्यापारसाध्ययागादिविशिष्ट इति कर्तृप्राधान्येनैव'* इत्युक्तम् ॥

तदिदं किंचित् विव्रियते – द्वितीयाद्यन्तपदार्थानां विभक्त्यर्थद्वारा धात्वर्थान्वय इत्यविवादम्। धात्वर्थस्य तिङर्थेऽन्वय इति*'प्रत्ययार्थः प्रधानम्'* इति न्यायसिद्धम्। तिङर्थस्तु क इति विवेचनीयम्। न तावत् कृतिः, *'लः कर्मणि च भावे चाकर्मकेभ्यः'* (पा.सू. 3.4.69) इति सूत्रेण कर्तृकर्माद्यर्थे लकारानुशासनेन तद्विरोधात्। तथा च कर्तुः कर्मणो वा लकारार्थस्यैव विशेष्यत्वम्। प्रथमान्तार्थस्यापि तत्रैवाभेदेनान्वयः। तथा च *'देवदत्तः तण्डुलं पचति'* इति वाक्यात् देवदत्ताभिन्नः तण्डुलकर्मकपाककर्ता इति बोधः। *'देवदत्तेन पच्यते तण्डुलः'* इति वाक्यात् तण्डुलाभिन्नं देवदत्तकर्तृकपाककर्म इति बोधः ॥

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एवं च *'पुरुषः प्रयाति तस्य पादयोरभिवादय'* इत्यत्र प्रधानस्याख्यातार्थस्य कर्तुः तच्छब्देन परामर्शात् पादयोरभिवादयेत्यनेनान्वयोऽप्युपपन्नो भवति।

'पश्य मृगो धावति' इत्यत्रापि मृगो धावतीत्यतः मृगाभिन्नः धावनकर्तेति बोधात् तिङर्थस्य कर्तुः कर्मत्वेन धावनेऽन्वयात् नानुपपत्तिः काऽपि। तिङर्थस्य कर्मत्वेऽपि तिङन्तस्य प्रातिपदिकसंज्ञाविरहात् न द्वितीयापत्तिः। त्वदभिन्नः मृगाभिन्नधावनकर्तृकर्मकदर्शनकर्ता इति बोधः। *'आनय गौर्धावति'* इत्यत्र गवाभिन्नधावनकर्तृकर्मकानयनकर्ता त्वदभिन्नः इति बोधः इति न काचित् अनुपपत्तिः। *'भावप्रधान-माख्यातम्'* इति निरुक्तवचनन्तु आर्थिकप्राधान्यपरतया कथंचिन्नेयम्। सर्वेऽपि कथंचिदेव हि तद्वचनं निर्वहन्ति। अत इदमपि मतं युक्तियुक्तमेव प्रतिभाति॥

(लेखकप्रदत्तं लेखनम्)

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निपातघटितवाक्येषु शाब्दबोधविचारः

रङ्गनाथशर्मा

'प्राग्रीश्वरान्निपाताः' (पा.सू. १ - ४ - ५६) इति पाणिनिसूत्रेण केषांचन शब्दानां निपातसंज्ञा विधीयते । सर्वे निपाता अव्ययेष्वन्तर्भवन्ति, 'स्वरादिनिपातमव्ययम्' (पा.सू. १.१.३७) इति सूत्रेण तेषामव्ययसंज्ञाविधानात् । निपातानामनल्पत्वात् प्रधानानामेव केषांचिद्योगे शाब्दबोधप्रकारोऽत्र चिन्त्यते । एतद्घटितवाक्येभ्यो जायमानशाब्दबोधप्रकारे निपातप्रयुक्तं यद्वैलक्षण्यं तन्मात्रप्रदर्शनार्थमयमुद्यमो, न तु समग्रवाक्यजन्यस्य शाब्दबोधस्वरूपस्य प्रदर्शने, तस्य प्रकृतेऽनुद्दिष्टत्वात्। सह, विना – इत्यादीनामव्ययानां केषांचित् निपातसंज्ञाभावेऽपि तद्घटितवाक्येषु शाब्दबोधप्रकारोऽत्र प्रसङ्गाद्विचार्यते, समानयोगक्षेमत्वात् तदर्थान्वयस्य। विचारश्च प्रायेण वैयाकरणमतानुरोधेन। यद्यपि वैयाकरणमते निपातानां द्योतकत्वाङ्गीकारात् सर्वोऽप्यर्थविशेषः समभिव्याहृतपदानामेवेति द्योत्यार्थस्य अन्वयप्रसङ्गो नास्ति, तथापि सोऽयमर्थविशेषः कुत्र कुत्र केन रूपेण भासते इत्यवबोधार्थं तद्विचारः प्रवर्तितः शास्त्रकारैः।

१. अथ नञर्थः।

अत्र पक्षद्वयम् । आरोपो नञर्थ इत्येकः पक्षः । अभावस्तदर्थ इति द्वितीयः । आरोपो नाम तदभाववन्निष्ठविशेष्यतानिरूपिततन्निष्ठप्रकारताकप्रतीतिः । तदभाववति तत्प्रकारकं ज्ञानमिति यावत्। न चायं भ्रमः। आहार्यत्वात्। 'अब्राह्मण' इति नञ्समासे आरोपो नञर्थः। विषयत्वं संसर्गः। आरोपश्च समभिव्याहृतपदार्थप्रवृत्तिनिमित्ते। 'अब्राह्मण' इत्यस्य आरोपविषयब्राह्मणत्ववान् इत्यर्थः। आरोपश्च ब्राह्मणभिन्ने ब्राह्मणत्वाभाववति सम्भवतीति ब्राह्मणभिन्न इत्यर्थः पर्यवस्यति । स च मानसबोधविषयः । अत्र ब्राह्मणशब्दस्यैव आरोपितब्राह्मणत्ववान् इत्यर्थः। नञ् तु तात्पर्यग्राहक इति द्योतकत्वपक्षः। 'अब्राह्मणः क्षत्रियः' इत्यत्र आरोपितब्राह्मणत्ववदभिन्नः क्षत्रियः इति शाब्दबोधः । ब्राह्मणत्वाभाववति ब्राह्मणत्वस्यारोपेऽपि शाब्दबोधो भवत्येव। शब्दजन्यज्ञाने बाधज्ञानस्य प्रतिबन्धकत्वानङ्गीकारात् । आरोपस्य नञर्थत्वे च 'आरोप्यायं क्रियागुणौ ततो निवर्तयति' इति नञ्सूत्रस्थभाष्यं मानम्। अत एव तत्पुरुषे उत्तरपदार्थस्य प्राधान्यमिति प्रवादो नञ्तत्पुरुषेऽपि सङ्गच्छते । अत एव च अतस्मै ब्राह्मणाय, असः शिवः इत्यादौ तदादिपदानामुपसर्जनत्वाभावात् सर्वनामता सिद्ध्यतीति तत्प्रयुक्तकार्यं निर्बाधम्। 'प्रतीयते सम्प्रति सोऽप्यसः परैः' इति माघे प्रयोगः। यद्यपि द्योतकतापक्षे ब्राह्मणपदस्य ब्राह्मणभिन्न इत्यर्थस्वीकारेऽपि 'अब्राह्मण' इत्यत्र उत्तरपदार्थप्राधान्यं न विहन्यते, तथापि 'असः' इत्याद्यनुरोधेन आरोपो नञर्थः। द्योतकतापक्षेण तदादीनां तद्भिन्न इत्याद्यर्थस्वीकारे तु सर्वनामकार्यं न स्यात्। 'उपसर्जनीभूतास्तु न

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सर्वादयः' इति सर्वनाम-संज्ञाभावात्। 'अतिसर्वाय देहि' इत्यत्र यथा। अत एव 'अनेकम्' इत्यत्र एकवचनं सिद्ध्यति। आरोपितैकत्वस्य सत्त्वात्। व्यस्तस्थलेऽप्येवमेव। 'घटो न पट' इत्यत्र पटे आरोपितपटत्वस्य बोधात् आरोपितपटत्ववदभिन्नो घट इति तत्समुदायजन्यशाब्दबोधः। पटभिन्नो घट इति बोधस्तु मानसः।

एवं तिङन्तसमभिव्याहारस्थलेऽपि नञर्थ आरोपः। तत्र धात्वर्थफलव्यापारयोः कर्मणि कर्तरि चारोपः। घटो नास्तीत्यत्र घटे सत्ताया आरोपः। बोधस्तु आरोपिता घटाभिन्नकर्तृनिष्ठा सत्तेति। घटाभावबोधो मानसः। 'चैत्रो न गच्छति' इत्यत्र चैत्राभिन्नकर्तृनिष्ठः आरोपितसंयोगानुकूलव्यापार इति बोधः। तत्र व्यापारस्य आरोपितत्वे बोधिते तज्जन्यफलस्याप्यारोपविषयत्वं बुध्यते। एवं नञ्समभिव्याहारे आरोपितफलव्यापारयोराश्रयत्वेन 'चैत्रस्तण्डुलं न पचति' इत्यादौ तण्डुलादेः कर्मत्वं चैत्रादेः कर्तृत्वं सुलभम्। 'वायौ रूपं नास्ति' इत्यत्र रूपकर्तृकसत्तायां वाय्वधिकरणकत्वमारोप्यते। आरोपितवाय्वधिकरणत्विका रूपकर्तृका सत्तेति बोधः। तेन वाय्वधिकरणकरूपकर्तृकसत्ताया अप्रसिद्ध्या कथं विशिष्टसत्तारोप इति शङ्काया नावसरः। 'ज्वरितो न भुञ्जीत' इत्यत्र आरोपितं ज्वरितकर्तृकं भोजनं प्रेरणाविषयीभूतम् इति बोधः। भोजनाभावः प्रेरणाविषयः इति तु मानसः। 'न कलञ्जं भक्षयेत्' इत्यत्राप्येवमेव। आरोपितकलञ्जभक्षणं प्रेरणाविषयीभूतमिति बोधे सति पश्चात् कलञ्जभक्षणाभावः प्रेरणाविषयः इति मानसबोधो जायते – इति। अस्मिन् पक्षे पूर्वोक्तबोधप्रकारस्य अनुभवारूढत्वाभावेन, आरोपे चानुगतकार्यकारणभावस्य दुर्वचत्वेन च द्वितीयः पक्षः आश्रीयते।

अस्मिन् पक्षे नञर्थोऽन्योन्याभावोऽत्यन्ताभावश्च। प्रागभावप्रध्वंसाभावौ न कदाचिन्नञ्द्योत्यौ। तत्र अन्योन्याभावो भेद एव। अस्मिन्नपि पक्षे मतद्वयम्। नञर्थः प्रतियोगिनि विशेषणमित्येके, विशेष्य इत्यपरे। तिङन्तसमभिव्याहारे नञर्थोऽत्यन्ताभावः, अन्यत्र तु भेदः। स च प्रतियोगिनि विशेषणमिति पक्षे 'अब्राह्मणः' इत्यत्र भेदस्य प्रतियोगितासम्बन्धेन उत्तरपदार्थेऽन्वयः। भेदप्रतियोगी ब्राह्मण इति बोधः। न च भेदप्रतियोगितायाः केवलान्वयितया घटादेरपि भेदविशिष्टत्वेन उक्तबोधो दुर्लभ इति वाच्यम्। ब्राह्मणत्वावच्छिन्नप्रतियोगितासम्बन्धेन भेदः प्रतियोगिनि विशेषणमिति स्वीकारात्। तेन सम्बन्धेन भेदविशिष्टताया ब्राह्मण एव सत्त्वात्। ब्राह्मणभिन्न इति बोधस्तु मानसः।

'अब्राह्मणः क्षत्रियः' इत्यत्र क्षत्रियस्य वृत्तित्वसम्बन्धेन नञर्थे भेदेऽन्वयः। भेदस्य प्रतियोगिता-सम्बन्धेन ब्राह्मणे। क्षत्रियवृत्तिभेदप्रतियोगी ब्राह्मण इति शाब्दधीः। निपातेतरनामार्थयोरेवाभेदान्वयनियमात्, प्रकृते नञर्थभेदस्य निपातार्थत्वेन भेदेनान्वये न दोषः। ब्राह्मणभिन्नः क्षत्रिय इति बोधस्तु मानसः। 'चैत्रो न पचति' इत्यत्र क्रियायोगेऽत्यन्ताभावो नञर्थः। स च प्रतियोगितासम्बन्धेन धात्वर्थव्यापारेऽन्वेति। चैत्रकर्तृकः विक्लित्त्यनुकूलव्यापारः अभावप्रतियोगी इति बोधः। न चैवं पचत्यपि चैत्रे 'न-पचति' इति प्रयोगापत्तिः, चैत्रकर्तृकपाकक्रियायाः मैत्रनिष्ठाभावप्रतियोगितया विषयाबाधादिति वाच्यम्। यदाश्रयः प्रतियोगी तदाश्रयोऽभावः इति लक्षणया चैत्रनिष्ठोऽभावो नञर्थ इति स्वीकारात्। उक्तस्थले चैत्रकर्तृकपाकानुकूल-व्यापारः चैत्रनिष्ठाभावप्रतियोगीति बोधस्वीकारात् मैत्रनिष्ठाभावमादाय 'चैत्रो न पचति' इति न प्रयोगः। 'भूतले

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घटो नास्ति' इत्यत्र भूतलवृत्तिघटकर्तृका सत्ता अभावप्रतियोगिनी इति बोधः। अधिकरणस्य कर्तृकर्मद्वारा क्रियान्वय इति नियमात्। 'घटः पटो न' इत्यत्र पटवृत्तिभेदप्रतियोगी घट इति बोधः। 'अनेकस्तिष्ठति' इत्यत्र प्रतियोगितासम्बन्धेन भेदविशिष्ट एकस्तिष्ठतीति बोधः। भेदप्रतियोगी एक इति वा। अनेकपदार्थे एकत्वभेदे बोधिते सङ्ख्यान्तरविशिष्टत्वमर्थाद्गम्यते। उत्तरपदार्थप्राधान्यादेकवचनम्। 'पतन्त्यनेके जलधाविवोर्मयः' इत्यादौ तु अनेकश्च अनेकश्च अनेकश्चेत्येकशेषात् बहुवचनमुपपादनीयम्। द्वयोरेकशेषे द्विवचनं तु न, अनभिधानात्। नागेशभट्टास्तु अनेके इति बहुवचनम् असाध्वेवेत्याहुः। नञ्-ार्थस्य विशेषणत्वादेव 'अत्वं भवसि' 'अतस्मै देहि' 'असः' इत्यादौ पुरुषव्यवस्था सर्वनामकार्यादिकं च सूपपादम्। 'अत्वं भवसि' इत्यत्र भेदप्रतियोगित्वदभिन्नकर्तृकं भवनमिति बोधः।

परन्तु पक्षेऽस्मिन् 'अघटमानय' इत्यादौ भेदप्रतियोगिनं घटमानयेत्यादिरीत्या बोधप्रकारो नानुभवारूढः। घटभिन्नमानयेत्यादिबोधस्यैव सर्वजनीनत्वात्। तस्मान्नञ्-ार्थः प्रतियोगिनि विशेष्य इति मतं सिद्धान्ते स्थितम्। प्रतियोगिनिष्ठविशेषणतानिरूपितविशेष्यताश्रयो नञ्-ार्थ इति यावत्। स च क्रियायोगेऽत्यन्ताभावः। अन्यत्र तु भेदः।

पर्युदासः स विज्ञेयो यत्रोत्तरपदेन नञ्।
प्रसज्यप्रतिषेधोऽयं क्रियया सह यत्र नञ्॥

इति वृद्धोक्तौ उत्तरपदशब्दः क्रियेतरशब्दोप-लक्षकः। पर्युदासो भेदः। प्रसज्यप्रतिषेधोऽत्यन्ताभावः। प्रसज्य - विधाय, प्रतिषेधो - निषेधः प्रसज्यप्रतिषेधः। 'सुप्सुपा' इति समासः। 'प्रसज्यायं क्रियागुणौ ततः पश्चान्निवृत्तिं करोति' इति नञ्-सूत्रे भाष्यकृतः। 'एतच्च प्रसज्यप्रतिषेध उच्यते' इति तत्रैव कैयटः। प्रसज्येति ल्यबन्तम्। अथवा प्रसज्यस्य - प्रतियोगिनि आरोप्य-माणस्य क्रियादिधर्मस्य प्रतिषेधः प्रसज्यप्रतिषेध इति षष्ठीतत्पुरुषः। यथा अन्धो न पश्यतीत्यत्र अन्धे दर्शनक्रियामारोप्य प्रतिषेधः। 'पाषाणो मृदुर्न भवति' इत्यत्र पाषाणे मार्दवगुणमारोप्य प्रतिषेधः।

एवञ्-च नञ्-समासे नञ्-ार्थो भेदः उत्तरपदार्थेन विशेष्यते। 'अब्राह्मणः क्षत्रियः' इत्यत्र ब्राह्मणपदार्थः प्रतियोगितया भेदेऽन्वेति। भेदश्च वृत्तित्वसम्बन्धेन क्षत्रिये। ब्राह्मणप्रतियोगिकभेदाश्रयः क्षत्रियः इति बोधः। अथवा ब्राह्मणपदस्य तद्भिन्ने लक्षणा। न तात्पर्यग्राहकः। नामार्थयोरभेदान्वयात् ब्राह्मणभिन्नाभिन्नः क्षत्रियः इति बोधः। एवं नञो वाचकतापक्षे द्योतकतापक्षे च किंचिदन्योन्यवैलक्षण्यं भवतीति बोध्यम्।

तिङन्तसमभिव्याहारे सर्वत्र अत्यन्ताभावो नञ्-ार्थः। 'चैत्रो न गच्छति' इत्यत्र चैत्रकर्तृक-गमनव्यापाराभाव इति बोधः। प्रकारतासम्बन्धेन नञ्-ार्थविशेष्यकशाब्दबोधं प्रति धातुजन्यव्यापारोपस्थितेः विशेष्यतासम्बन्धेन हेतुत्वात्। 'भूतले घटो न' इत्यत्र अस्तीत्यध्याहारः। तिङन्तेन योगादत्यन्ताभावो नञ्-ार्थः। भूतलवृत्तिघटकर्तृकसत्ताया अभाव इति शाब्दधीः। अधिकरणस्य कर्तृकर्मद्वारा क्रियान्वयनियमात् भूतलस्य कर्तृभूतघटद्वारा सत्तायामन्वयो न त्वभावे। घटसत्ताया अभावे बोधिते घटाभावोऽपि बुध्यते।

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समनियताभावयोरैक्यात्। स्वाधिकरणवृत्त्यत्यन्ताभावाप्रतियोगित्वे सति स्वाभाववदवृत्तित्वम् समनियतत्वम्। अधिकरणस्य भूतलस्य नञर्थाभावे साक्षादन्वयाभावेऽपि भूतलवृत्तित्वेनैवाभावः प्रतीयते, समभिव्याहार-बलात्। प्रतियोगीं यद्वृत्तित्वेन प्रतीयते, तद्वृत्तित्वेनैव तदभावः प्रतीयते इत्यङ्गीकारात्। 'भूतले घटो नास्ति' इत्यत्र पूर्वोक्तरीत्या बोधितो घटाभावः भूतलवृत्तित्वेन प्रतीयते, प्रतियोगिनो घटस्य भूतलवृत्तित्वेन प्रतीतत्वात्। 'वायौ रूपं नास्ति' इत्यत्र रूपपदस्य रूपप्रतियोगिकात्यन्ताभावे लक्षणा। वाय्वधिकरणिका रूपाभावकर्तृका सत्तेति बोधः। अथवा वायौ रूपज्ञानमाहार्यं विकल्पात्मकम्। तद्विषयस्य रूपस्य बाह्यसत्तानिषेध इति नानुपपत्तिः।

भावार्थककृदन्तयोगे समासेऽपि नञोऽभावोऽर्थः। अभोजनम्, अगमनम्, अपाकः इत्यादौ भोजनाभाव इत्याद्यर्थप्रतीतेः। 'एकादश्यामभोजनम्' इत्यत्र यथा। एवमदृष्ट्वा, अकर्तुम् इत्यादावपि। क्त्वातुमुनोः भावार्थकत्वात्। एवमसन्देहः, अनुपलब्धिः, अमार्दवम्, अरूपम्, अस्पर्शः – इत्यादौ गुणयोगेऽपि। 'आरोप्य क्रियागुणौ ततो निवर्तयति' इति नञ्सूत्रस्थभाष्यात्। क्रियागुणयोः योगे सर्वत्र नञोऽभावार्थकत्वमिति फलति।

द्योतकत्वपक्षे कश्चिदस्ति विशेषः। 'चैत्रो न पचति' इत्यादौ धातोरेवव्यापाराभावपर्यन्तोऽर्थः। नञ् तु तात्पर्यग्राहकः। अत्र पक्षे 'चैत्रेण न पच्यते तण्डुलः' इत्यादौ धात्वर्थव्यापाराभावाश्रयत्वेन चैत्रादेः कर्तृत्वम् तत्प्रयोज्यफलाभावाश्रयत्वेन च तण्डुलादेः कर्मत्वं सुलभम्। 'अब्राह्मण' इत्यादौ ब्राह्मणपदस्य तद्भिन्ने लक्षणा। अथवा शक्तिरेव। सर्वेषां पदानां तत्तदर्थेषु तद्भिन्नेषु च शक्तिरिति नञ्सूत्रस्थभाष्यप्रदीपोद्योते स्पष्टम्। अतस्मै, असः इत्यादौ तु 'एतत्तदोः सुलोपोऽकोरनञ्समासे हलि'(पा.सू. ६.१.१३२) इति ज्ञापकात्सर्वनामसंज्ञा। असः शिवः इत्यत्र सुलोपवारणाय खलु अनञ्समासे इति विशेषणम्। एवंच नञ्समासे सर्वनामसंज्ञा भवतीत्यत्र ज्ञापकमेवेदम्। उत्तरपदार्थप्रधानस्तत्पुरुष इति तु प्रायिकम्। 'पूर्वकाय' इत्यादौ व्यभिचारात्। 'अनेकम्' इत्यत्र औत्सर्गिकमेकवचनमिति सङ्क्षेपः।

यत्तु –

तत्सादृश्यमभावश्च तदन्यत्वं तदल्पता।
अप्राशस्त्यं विरोधश्च नञर्थाः षट् प्रकीर्तिताः॥

इत्युक्त्वा 'अनश्वः' इत्यादीन्युदाहरणानि प्रदर्श्यन्ते, तत्र अभावः अत्यन्ताभावः, तदन्यत्वं भेदः। उभौ प्रदर्शितावेव। अन्ये सादृश्यादयोऽर्थास्तु प्रकरणादिना गम्यमानाः न तु साक्षाद्बोध्यमानाः। एवंच भेदोऽभावश्च द्वयं नञर्थः। अभावश्चात्यन्ताभाव इत्युक्तमेव। 'रक्तघटे श्यामो नास्ति' इत्यत्रापि अत्यन्ताभावः प्रतीयते, न तु ध्वंसः नापि प्रागभाव इति सङ्क्षेपः।

२. अथ एवकारार्थः।

एवशब्दस्य अवधारणमर्थः। अवधारणं व्यवच्छेदः स त्रिविधः। अयोगव्यवच्छेदः, अन्ययोगव्यवच्छेदः, अत्यन्तायोगव्यवच्छेदश्चेति। तदुक्तम् –

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अयोगमन्ययोगंचात्यन्तायोगमेव च।
व्यवच्छिनत्ति धर्मस्य एवकारस्त्रिधा मतः ॥ इति।

तत्र विशेषणसङ्गतस्यैवकारस्य अयोगव्यवच्छेदः, विशेष्यसङ्गतस्य अन्ययोगव्यवच्छेदः, क्रियासङ्गतस्य तु अत्यन्तायोगव्यवच्छेदोऽर्थ इति विभागः। योगः - सम्बन्धः, तस्य व्यवच्छेदः - प्रतिषेधः अभावः इति यावत्। अयोगव्यवच्छेदः सम्बन्धाभावाभावः। सम्बन्धश्च एवकाराभावे यः प्रतीयते स एव। शङ्खः पाण्डुर एवेत्यत्र विशेषणसङ्गतस्यैवकारस्य अयोगव्यवच्छेदोऽर्थः। पाण्डुरत्वस्य गुणस्य शङ्खे सम्बन्धः समवायः। पाण्डुरत्वस्य एवकारार्थैकदेशे सम्बन्धे, द्वितीयाभावस्य शङ्खे चान्वयः। पाण्डुरत्वसम्बन्धाभावाभाववान् शङ्ख इति बोधः। अत्र शङ्खत्वावच्छेदेन शङ्खे पाण्डुरत्वसम्बन्धः प्रतीयते। अभावस्य अभावबोधनं प्रकृतसम्बन्धं दृढयितुम्। अत्रेदं चिन्त्यम्। पाण्डुरशब्दो गुणिवाचकः। 'गुणवचनेभ्यो मतुपो लुगिष्टः' इति वचनात् मतुप् प्रत्ययो लुप्तः। धर्मिणि विशेषणतया उपस्थितस्य पाण्डुरत्वस्य अन्यत्र एवकारार्थे विशेषणतया अन्वयो दुर्लभः। किंच, एवकाराभावे पाण्डुरशङ्खयोस्तादात्म्यं प्रतीयते, न तु समवायः सम्बन्धः। तस्मात् तादात्म्याभावव्यवच्छेदोऽत्र एवकारार्थः। पाण्डुरतादात्म्याभाव-व्यवच्छेदवान् शङ्खः इति बोधः। व्यवच्छेदोऽभावः।

पार्थ एव धनुर्धरः।

अत्र विशेष्यसङ्गतस्यैवकारस्य अन्ययोगव्यवच्छेदः अर्थः। अन्यो भेदाश्रयः। भेदश्च समभिव्याहारमहिम्ना पार्थप्रतियोगिकः प्रतीयते। एवकारार्थैकदेशस्य व्यवच्छेदस्य (अभावस्य) आश्रयता-सम्बन्धेन धनुर्धरत्वे अन्वयः। एवंच, पार्थप्रतियोगिकभेदाश्रयसम्बन्धाभाववद्धनुर्धरत्ववदभिन्नः पार्थ इति शाब्दबोधः। पूर्वोक्तरीत्या तु अन्यतादात्म्याभावः एवकारार्थः। पार्थान्यतादात्म्याभाववद्धनुर्धराभिन्नः पार्थ इति बोधः।

नीलं सरोजं भवत्येव।

अत्र क्रियासङ्गतस्यैवकारस्य अत्यन्तायोगव्यवच्छेदः अर्थः। अयोगे आत्यन्तिकत्वं व्यवच्छिद्यते। आत्यन्तिकत्वंच अन्वयितावच्छेदकव्यापकत्वम्। प्रकृते च सरोजत्वमन्वयितावच्छेदकम्। सरोजानि नानावर्णानि भवन्ति, नीलानि, रक्तानि, श्वेतानि च। यद्यपि सर्वाणि सरोजानि नीलानि न, तथापि क्वचित् नीलमपि सरोजमस्त्येवेति प्रतिज्ञावाक्यमेतत्। अत्र नीलत्वादेः सरोजत्वादिसामानाधिकरण्येनान्वयः, न तु अवच्छेदकावच्छेदेन, बाधात्। अत एव अयोगे आत्यन्तिकत्वं व्यवच्छिद्यत इति पूर्वमुक्तम्। एवंच अयोगव्यवच्छेद एवायम्। विशेषणसङ्गतस्थले अवच्छेदकावच्छेदेन पाण्डुरत्वादेरन्वयः, अत्र तु सामानाधिकरण्येनान्वय इत्येतावता अत्यन्तायोगव्यवच्छेद इति व्यवहारः। अत्र अयोगे व्यवच्छेदे च खण्डशः शक्तिः। नीलपदार्थस्य अयोगे तादात्म्याभावे अन्वयः। धात्वर्थभवनस्य व्यवच्छेदे। एवंच

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नीलतादात्म्याभाववत्सरोजकर्तृकभवनाभाव इति बोधः । वस्तुतस्तु, अयोगव्यवच्छेदोऽत्र अभावाभावरूपः । धात्वर्थभवनस्य प्रतियोगितया तत्रान्वयः । नीलाभिन्नसरोजकर्तृकभवनाभावाभाव इत्येव शाब्दबोध इत्यलं विस्तरेण ।

पृथिव्यामेव गन्धः ।

अत्र अन्ययोगव्यवच्छेदः एवकारार्थः । तथा हि । सप्तम्याः अधिकरणत्वमर्थः । पृथिव्याः तत्र वृत्तित्वसम्बन्धेनान्वयः । अधिकरणत्वस्य स्वनिरूपिताधेयत्वसम्बन्धेन गन्धेऽन्वयः । एवशब्दस्य पृथिव्यन्यनिष्ठाधिकरणतानिरूपितत्वाभावोऽर्थः । सोऽयमन्ययोगव्यवच्छेदः । तस्य आश्रयतासम्बन्धेन सम्बन्धैकदेशाधेयतायामन्वयः । तथा च पृथिवीनिष्ठाधिकरणतानिरूपिता या आधेयता पृथिवीतरनिष्ठाधिकरणतानिरूपितत्वाभाववती तदाश्रयो गन्ध इति शाब्दधीः । पृथिवीतरावृत्तिः पृथिवीवृत्तिर्गन्ध इति सङ्क्षिप्तबोधाकारः ।

ननु विशेष्यसङ्गतस्यैवकारस्य अन्ययोगव्यवच्छेदोऽर्थ इति पूर्वमुक्तम् । 'पृथिव्यामेव गन्धः' इति वाक्यजबोधे पृथिव्याः विशेषणत्वेनैव प्रतीयमानत्वात् कथं तत्सङ्गतस्यैवकारस्य अन्ययोगव्यवच्छेदार्थकत्वमिति चेत्, उच्यते। तत्र 'विशेषण' पदस्य विधेयार्थकत्वम्, 'विशेष्य' पदस्य च उद्देश्यार्थकत्वं बोध्यम्। 'पृथिव्यामेव गन्धः' इत्यत्र पृथिव्याः उद्देश्यत्वम्, गन्धस्य तु विधेयत्वं प्रतीयते । ततश्च उद्देश्यगतस्यैवकारस्य अन्ययोगव्यवच्छेदोऽर्थ इति न पूर्वोक्तविरोधः । उद्देश्यताविधेयते च अतिरिक्ते एव विषयते । न तु विशेष्यताप्रकारतारूपे । अत एव 'चैत्रो गच्छति' इत्यादौ क्रियाया विधेयताप्रतीतिः ।

चैत्रस्यैवेदं धनम् ।

अत्रापि अन्ययोगव्यवच्छेदः एवकारार्थः । स्वामितानिरूपितस्वत्वं चैत्रपदोत्तरषष्ठ्या अर्थः । चैत्रेतरनिष्ठस्वामितानिरूपितत्वाभावः एवकारार्थः । अस्य आश्रयतासम्बन्धेन स्वत्वेऽन्वयः । चैत्रनिष्ठस्वामित्वनिरूपितं चैत्रेतरनिष्ठस्वामितानिरूपितत्वाभाववच्च यत् स्वत्वं तद्वत् धनमिति शाब्दबोधः ।

अन्ये तु अवधारणं ज्ञानविशेषमाहुः । अयोगव्यवच्छेदादिकं ज्ञाने प्रकारः । अवधारणस्य विषयतासम्बन्धेन यथायथं विशेषणादिष्वन्वयः । 'अवधारणविषयपाण्डुराभिन्नः शङ्खः,' 'अवधारणविषयपार्थाभिन्नो धनुर्धरः', 'नीलसरोजकर्तृकभवनमवधारणविषयः' इति शाब्दबोधः ।

लवणमेवासौ भुङ्क्ते ।

अत्र प्राचुर्यमेवकारार्थः । तस्य आश्रयतासम्बन्धेन अध्याहृतेऽन्नादावन्वयः । लवणप्राचुर्यवदन्नादिकं भुङ्क्ते इत्यर्थः ।

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चैव भोक्ष्यसे।

'एवे चानियोगे' इति वार्तिकात् अनवधारणमेवकारार्थः। अनवधारणमसम्भावना। यत्किंचिद-धिकरणकत्वत्कर्तृकभविष्यत्कालिकभोजनं सम्भावनाविषयत्वाभाववत् – इति बोधः। स्थलाभावादिना भोजनसम्भवाभावोऽत्र बोध्यते।

३. अथ इवार्थः।

अत्र बहवो मतभेदाः। तेषां दिङ्मात्रं प्रदर्श्यते। 'कमलमिव मुखम्' इत्यत्र इवशबदार्थः सादृश्यम्। तच्च पदार्थान्तिरम्। तद्भाने समानधर्मः प्रयोजकः इत्येके। कमलस्य निरूपितत्वसम्बन्धेन सादृश्येऽन्वयः। तस्य आश्रयतासम्बन्धेन मुखेऽन्वयः। कमलनिरूपितसादृश्याश्रयो मुखमिति बोधः। यद्वा, प्रतियोग्यनुयोगिभावेनान्वयात् कमलप्रतियोगिकसादृश्यानुयोगि मुखमिति बोधः। आह्लादकत्वाख्यः साधारणो धर्मः व्यत्र-जनयाबुध्यते। निपातेवार्थस्य नञ्-र्थस्येव भेदसंसर्गेण नामार्थविशेष्यत्वे विशेषणत्वे च न दोषः। 'कमलमिव सुन्दरं मुखम्' इत्यत्र कमलनिरूपितसादृश्यवन्मुखं सौन्दर्यवदभिन्नम् इति बोधः। सादृश्यप्रयोजकं सौन्दर्यमिति तु अर्थाद्गम्यते। 'कमलवत् सुन्दरं मुखम्' इत्यत्र तु भवतीत्यध्याहारः। 'तेन तुल्यं किया चेद्वतिः' (पा.सू. ५.१.११५) इति सूत्रेण कियातौल्ये एव वतिविधानात्। कमलपदस्य तत्कर्तृकभवने लक्षणा। कमलकर्तृकभवनसदृशम् इति कमलवत् पदार्थः। तदभिन्नं सुन्दरमुखकर्तृकं भवनम् इति बोधः। ततश्च कमलमुखयोः सौन्दर्यकृतं सादृश्यं मानसबोधविषयः।

अत्र पक्षे 'चन्द्रमिव मुखं पश्यामि' इत्यादौ चन्द्रादेः द्वितीया न स्यात्। चन्द्रपदार्थस्य इवार्थसादृश्येऽन्वयेन दर्शनक्रियाकर्मत्वाभावात्। तस्मात् चन्द्रादेः तत्सदृशे लक्षणा। इवशब्दस्तात्पर्य-ग्राहकः। चन्द्रसदृशाभिन्नं मुखं पश्यामीत्यर्थः। स्वाभिन्नमुखद्वारा फलाश्रयत्वात् चन्द्रपदार्थस्य कर्मता। 'चैत्रस्येव मैत्रस्य गृहम्' इत्यत्र गृहमित्यावृत्त्या चैत्रस्य गृहमिव मैत्रस्य गृहमिति योजना। चैत्रसम्बन्धिगृहसदृशाभिन्नं मैत्रसम्बन्धिगृहमिति शाब्दबोधः। औन्नत्यवैशाल्यादिसाधारणो धर्मस्तु गम्यः। 'शरैरुस्रैरिवोदीच्यान् उद्धरिष्यन् रसानिव' इत्यत्र उस्रसदृशैः शरैः रससदृशान् उदीच्यान् उद्धरिष्यन् इत्याद्यर्थः। शराणां रसानांच तत्तत्सदृशेषु लक्षणास्वीकारादेव करणत्वं कर्मत्वंच बोध्यम्। इवशब्दस्तु द्योतकः। अन्यथा तदुत्तरतृतीयाया द्वितीयायाश्च अनन्वयप्रसङ्गः। 'गज इव शूरो गच्छति' इत्यत्र गजशब्दस्य गजकर्तृकगमनसदृशे लक्षणा। तदभिन्नं शूरकर्तृकं गमनमिति बोधः।

तद्भिन्नत्वे सति तद्गतभूयोधर्मवत्त्वं सादृश्यमित्यपरे। भूयोधर्माश्च आह्लादकत्वादयः साधारणधर्माः। तद्गतत्वंच तत्सम्बन्ध एव। 'कृत्तद्धितसमासे यः सम्बन्धाभिधानं भावप्रत्ययेन' इति हरिवचनात्। एवंच साधारणधर्मसम्बन्धः सादृश्यमिति फलति। तन्मते 'अरविन्दमिव सुन्दरं मुखम्' इत्यत्र अरविन्दपदार्थः आधेयतासम्बन्धेन इवपदार्थे साधारणधर्मेऽन्वेति। साधारणधर्मस्य अभेदेन सम्बन्धेन सुन्दरपदार्थैकदेशे सुन्दरत्वेऽन्वयः। ततश्च अरविन्दवृत्तिसमानधर्माभिन्नसुन्दरत्ववदभिन्नं वदनमिति बोधः। यत्र तु सुन्दरत्वादिकं नोपात्तं 'अरविन्दमिव मुखम्' इत्यादौ तत्र साधारणधर्मस्य आश्रयतया-

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उपमेयेऽन्वयः । अरविन्दवृत्तिसाधारणधर्माश्रयो मुखमिति बोधः । अस्मिन्नपि पक्षे 'अरविन्दमिव मुखं पश्यामि' इत्यत्र पूर्वोक्तदोषः स्थितः ।

नागेशभट्टास्तु – "सादृश्यमतिरिक्तः पदार्थः । साधारणधर्मस्तु सादृश्यप्रयोजकः । इवशब्दस्तु स्वसमभिव्याहृतचन्द्रादावुपमानत्वं तन्निर्वाहकमाह्लादकत्वादिसाधारणधर्मसम्बन्धंच द्योतयति । उपमानत्वंच साधारणधर्मवत्त्वेन ईषदितरपरिच्छेदकत्वम् । परिच्छेदकत्वादेव तस्य विशेषणता । परिच्छेदकत्वंच परिच्छेद्यप्रतीतिं विना अनुपपन्नम् इति मुखादावुपमेयत्वंच द्योतयति इवशब्दः । साधारणधर्मश्च क्वचित् शब्देनोपात्तः, क्वचिदाक्षिप्तः । उपमानोपमेययोः यद्यपि स्वस्वरूपेण भेदः, तथापि आह्लादकत्वादिसाधारणधर्मवत्त्वेन अभेदः । अत एव उपमानतावच्छेदकधर्ममुपमेये आरोप्य तयोरभेदेन अन्वयः । एवंच 'चन्द्र इव मुखमाह्लादकम्' इत्यत्र चन्द्रे आह्लादकत्वमुपमानत्वंच, मुखे उपमेयत्वंच इवशब्दो द्योतयति । तथा च आह्लादकोपमानभूतचन्द्राभिन्नमाह्लादकमुपमेयं मुखमिति शाब्दबोधः । साधारणधर्मसम्बन्धश्च क्वचिद्विशेषणतया। यथा 'चन्द्र इव मुखमाह्लादकम्' इत्यत्र। क्वचिद्विशेष्यतया। यथा 'चन्द्र इव मुखमाह्लादयति' इत्यत्र । अत्र हि साधारणधर्मः विशेष्यतया तिङन्तेन उपात्त इति 'उपमानचन्द्रकर्तृकाह्लादाभिन्नः उपमेयमुखकर्तृकाह्लादः' इति बोधः । उपमानोपमेययोरभेदान्वयादेव 'चन्द्रमिव मुखं पश्यामि' इत्यादौ तयोरेकविभक्तित्वनियमः । 'गज इव गच्छति चैत्रः' इत्यत्र गजशब्दस्य उपमानभूतगजकर्तृकगमनम् इत्यर्थः । उपमानभूतगजकर्तृकगमनाभिन्नमुपमेयदेवदत्तकर्तृकं गमनम् – इति बोधः" इत्याहुः ।

सम्भावनापि इवशब्दद्योत्या । उत्कटैकतरकोटिकः संशयः सम्भावना । भूयोधर्मवत्त्वं समभावनायां प्रयोजकम् । इवार्थे सादृश्ये तद्गतभूयोधर्मवत्त्वं तद्भिन्ने प्रतीयते । सम्भावनायान्तु तद्गतभूयोधर्मवत्त्वेन निमित्तेन तद्भिन्ने तत्तादात्म्यमुत्कटकोटिकत्वेन प्रतीयत इति विशेषः । 'दूरे तिष्ठन् देवदत्तः यज्ञदत्त इव दृश्यते' इत्यत्र इवशब्दार्थः सम्भावना । यज्ञदत्तस्य प्रकारतानिरूपकत्वसम्बन्धेन सम्भावनायामन्वयः । तस्याश्च विषयतासम्बन्धेन देवदत्तेऽन्वयः । तादात्म्यंच प्रकारतायां संसर्गः । एवंच तादात्म्यसंसर्गेण यज्ञदत्तनिष्ठप्रकारतानिरूपकसम्भावनाविषयदेवदत्तनिष्ठा चाक्षुषज्ञानविषयता – इति 'देवदत्तो यज्ञदत्त इव दृश्यते' इति वाक्याज्जायमानः शाब्दबोधः । तिङन्तेन योगे सर्वत्र इवार्थः सम्भावना । 'न वै तिङन्तेनोपमानमस्ति' इति सन्सूत्रस्थभाष्यात् । 'चैत्रो गच्छतीव' इत्यत्र चैत्रकर्तृकगमनं सम्भावनाविषयभूतम् – इति बोधः । चैत्रकर्तृकयत्किंचिद्व्यापारेण निमित्तेन गमनं सम्भावनाविषयीकृतम् । इयंच सम्भावना आहार्या, अनाहार्येति द्विविधा । अनाहार्या पूर्वोक्तस्थले । तस्या आहार्यत्वे तु 'धूमस्तोमं तमः शङ्के' इत्यादौ उत्प्रेक्षालङ्कार इत्यालङ्कारिकाणां व्यवहारः ।

४. अथ सहशब्दार्थः ।

'पुत्रेण सहागच्छति पिता' इत्यादौ साहित्यं सहशब्दार्थः । तच्च स्वसमभिव्याहृतशब्दजन्योपस्थितिविषयक्रियादिसमानकालिकतत्क्रियादिमत्त्वम् । तृतीयार्थस्तु सहार्थानुयोगिनः मित्रादेः

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क्रियादौ यादृशः सम्बन्धः सः। स च क्रियावाचकशब्दसत्त्वे कर्तृत्वादिः, द्रव्यगुणयोर्योगे स्वत्वादिः। प्रकृते आगमनसमानकालिकागमनं सहशब्दार्थः। पुत्रशब्दोत्तरतृतीयार्थः कर्तृत्वम्। तस्य निरूपकत्वसम्बन्धेन सहार्थैकदेशे प्रथमागमने (पुत्रागमने) अन्वयः। द्वितीयागमनस्य (पितुरागमनस्य) कर्तृत्वसम्बन्धेन आश्रयतासम्बन्धेन वा पितर्यन्वयः। तस्य अभेदसम्बन्धेन तिङर्थे कर्तरि। तस्याधेयतासम्बन्धेन धात्वर्थगमनेऽन्वयः। वर्तमाने लट्। 'पुत्रकर्तृकागमनसमानकालिकागमनाश्रयपित्रभिन्नकर्तृनिष्ठं वर्तमानकालिकमागमनम्' – इति बोधः। अस्मिन् बोधे पितर्यागमनक्रियाया द्वेधा भानं द्रष्टव्यम्। उद्देश्यतावच्छेदकविधेययोरैक्यं तु तयोरीषदेभ्दमादाय व्युत्पत्तिवादे परिहृतम्। विस्तरस्तु तत्रैव द्रष्टव्यः। वैयाकरणनये तु साहित्यमखण्डोपाधिरूपम्। तच्च समानदेशकालस्वत्त्वादिसम्बन्धैः एकक्रियाद्रव्याद्यन्वयित्वसमनियतम्। 'पुत्रेण सह आगच्छति पिता' इत्यत्र पुत्रसाहित्यवान् पिता आगच्छति इत्येव बोधः। पुत्रे समानकालिकागमनं तु सहशब्दान्वयबलात् पश्चात् प्रतीयते। आगमनक्रियान्वयः पितरि शाब्दः, पुत्रे तु आर्थः। अत एव 'सहयुक्तेऽप्रधाने (पा.सू. २.३.१९) इति सूत्रेण पुत्रशब्दात् तृतीया। पुत्रे अप्रधानत्वं हि शाब्दगुणाद्यन्वयित्वाभावरूपम्। न तु लौकिकमप्रधानत्वम्। 'राज्ञा सह सेना आगच्छति' इत्यत्र राजशब्दात् तृतीयानापत्तेः। एवंच तृतीयान्तार्थे क्रियादिप्रतीतिर्मानसी इत्येव सूत्रस्वरसः।

पुत्रेण सह पिता स्थूलः।

अत्र पुत्रसाहित्यवान् पिता स्थूलः इति,

पुत्रेण सह पितुर्धनम्।

इत्यत्र पुत्रसाहित्यवतः पितुर्धनमिति च बोधः। पुत्रे समानकालिकस्थौल्यस्य, धने पुत्रवृत्तिस्वामितानिरूपितस्वत्वस्य च बोधो मानसः। यदि तु पुत्रेऽपि क्रियादिसम्बन्धः शाब्दबोधे भासते, न त्वसौ मानसबोधविषय इत्यनुभवः, तर्हि समभिव्याहृतपदबोध्यक्रियादिसमानकालिकत्वं सहशब्दार्थः। 'पुत्रेण सह आगच्छति पिता' इत्यत्र आगमनसमानकालिकत्वं साहित्यम्। पुत्रस्य कर्तृत्वसम्बन्धेन आगमने समानकालिकत्वस्य आश्रयतासम्बन्धेन धात्वर्थे आगमनेऽन्वयः। 'पुत्रकर्तृकागमनसमानकालिकं पितृकर्तृकागमनम्' – इति बोधः। 'पुत्रेण सह स्थूलः' इत्यत्र स्थौल्यसमानकालिकत्वं सहशब्दार्थः। तस्य स्थूलपदार्थैकदेशे स्थौल्येऽन्वयः। 'पुत्रवृत्तिस्थौल्यसमानकालिकस्थौल्यवान् पिता' इति बोधः। 'पुत्रेण सह पितुर्धनम्' इत्यत्र स्वामितानिरूपितस्वत्वसमानकालिकत्वं सहशब्दार्थः। तस्य षष्ठ्यर्थसम्बन्धेऽन्वयः। पुत्रवृत्तिस्वामितानिरूपितस्वत्वसमकालिकं यत् पितृनिष्ठस्वामितानिरूमितं स्वत्वं तद्वत् धनमिति बोधः। अत्र पक्षे पुत्रस्य पितर्यन्वयः परम्परया। 'सपुत्रः पिता आगतः' इति समासस्तु 'तेन सहेति तुल्ययोगे' (पा.सू. २.२.२८) इति सूत्रबलात् समर्थनीयः। अत्र साहित्यमखण्डोपाधिरिति पक्ष एव ज्यायानिति प्रतिभाति। पूर्वोक्तशाब्दबोधप्रकारस्तु समानवित्तिवेद्यत्वेन उपपादनीयः। अत्र विद्वांसः प्रमाणम्। यत्र माषवापोत्तर तिलवापः तत्र 'माषैः सह तिलान् वपति' इति प्रयोगे समानदेशत्वमात्रप्रतीतिः, न तु समानकालिकत्वस्य। 'सहैव दशभिः पुत्रैः भारं वहति गर्दभी' इत्यत्र यदि 'दशानां पुत्राणां विद्यमानत्वेऽपि' इत्यर्थो बुबोधयिषितः, तर्हि सत्तासमकालिकत्वं सहार्थ इत्यभ्युपेयम्। दशपुत्रसत्तासमानकालिकं गर्दभीकर्तृकं भारकर्मकं वहनम् – इति बोधः।

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५. अथ चशब्दार्थः।

'चार्थे द्वन्द्वः' (पा.सू.२.२.२९) इति सूत्रे सिद्धान्तकौमुद्यामेवमुक्तम् । 'समुच्चयान्वाचयेतरेतरयोगसमाहाराश्चार्थाः । परस्परनिरपेक्षस्यानेकस्य एकस्मिन् अन्वयः समुच्चयः । अन्यतरस्य अनुषङ्गिकत्वे अन्वाचयः । मिलितानामन्वयः इतरेतरयोगः । समूहः समाहारः' इति । 'एकस्मिन् अन्वयः समुच्चयः' इत्यत्र 'अन्वयः' इति प्रतीकमादाय 'यत्रैवमन्वयः तत्र समुच्चयः चशब्दार्थः। न त्वन्वय एव समुच्चय इति भ्रमितव्यम्' । इति नागेशभट्टाः व्याचख्युः । तत्र 'समुच्चयान्वाचययोः चशब्दो द्योतकः, तदर्थस्य साहित्यस्य विशेषणतया समभिव्याहृतपदार्थे प्रतीतेः । इतरेतरयोगसमाहारयोस्तु चशब्दो वाचकः । तदर्थसाहित्यस्य तत्र विशेष्यतया प्रतीतेः' इत्यपि तैरेव भाष्यप्रदीपोद्योते प्रतिपादितम्। एवंच चशब्दार्थः साहित्यम् । साहित्यंच बहुविधम् । समुच्चयादयः साहित्यभेदाः इति विज्ञायते । सहशब्दार्थसाहित्यं नियमेन समानकालिकत्वादिघटितम्। समुच्चयादयस्तु न तथेति भेदः ।

ईश्वरं गुरुं च भजस्व ।

अत्र चशब्दार्थः समुच्चयः। स च स्वसमभिव्याहृतगुरुपदार्थविशेषणतया ईश्वरपदार्थविशेष्यतया च बुध्यते । ईश्वरप्रतियोगिकसमुच्चयाश्रयं गुरुमित्यर्थः । अथवा गुरुपदस्य ईश्वरसमुच्चितगुरौ लक्षणा । चशब्दस्तु तात्पर्यग्राहक इति यावत्। अत्र एकस्य कियान्वयोत्तरम् अपरस्य क्रियावाचकपदावृत्त्या अन्वय इति लघुशब्देन्दुशेखरे नागेशभट्टैरुक्तम्। तथा च 'ईश्वरं भजस्व' 'ईश्वरसमुच्चितं गुरुं भजस्व' इति वाक्यद्वयं निष्पद्यते । 'ईश्वरं गुरु च भजस्व; इत्यत्र तु एकवाक्यता प्रतीयते । एकार्थविशेष्यकशाब्दबोधजनकत्वं कथमुक्तवाक्यद्वयस्य? मम तु एवं प्रतिभाति । ईश्वरभजनविशिष्टं गुरुभजनमिति बोधः । वैशिष्ट्यंच स्वबोधोत्तरकालिकबोधविषयत्वेन, समुच्चितत्वेन वा। गुरोरिव गुरुभजनस्यापि समुच्चितत्वे न किंचित् बाधकम् । 'ईश्वरभजनं कुरु गुरुभजनंच' इत्युक्तौ भजनसमुच्चयस्य प्रतीतेः । तथा च उक्तस्थले त्वमित्यध्याहारः। भजेः प्रीत्यनुकूलव्यापारोऽर्थः। लोडर्थः प्रेरणा। तस्या विषयतासम्बन्धेन धात्वर्थव्यापारे अन्वयः। ईश्वरनिष्ठप्रीत्यनुकूलः त्वदभिन्नकर्तृनिष्ठो यो व्यापारः प्रेरणाविषयः तद्विशिष्टः ईश्वरसमुच्चितगुरुनिष्ठप्रीत्यनुकूलस्त्वत्कर्तृकः व्यापारः प्रेरणाविषयः – इति शाब्दबोधः। अत्र सुधियः प्रमाणम्।

देवदत्तः पचति हसति च ।

अत्र क्रियासमुच्चयः।देवदत्तकर्तृकपचनव्यापारसमुच्चितः देवदत्तकर्तृकहसनव्यापारः – इति बोधः।

भिक्षामट गांचानय ।

अत्र चशब्दार्थोऽन्वाचयः । आनुषङ्गिकत्वं व्याप्यत्वंच चशब्द द्योत्यम् आनुषङ्गिकत्वम् अनुद्देश्यरूपमप्राधन्यम्। उभयमपि च शब्दसमभिव्याहृत - नी - धात्वर्थानयनक्रियायाम्। आनयनक्रियागतव्याप्यत्वंच चशब्दार्थप्रतियोग्यटनक्रियानिरूपितम् । तथा च 'भिक्षामट, गांचानय' इत्यतः प्रेरणाविषयीभूतत्वत्कर्तृकभिक्षाटनव्याप्यमानुषङ्गिकं प्रेरणाविषयीभूतं त्वत्कर्तृकगवानयनम् – इति बोधः।

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उद्भूतावयवभेदः समूहः इतरेतरयोगः। उद्भूतः - प्रकटः अवयवानां भेदः यस्य सः उद्भूतावयवभेदः। उद्भूतावयवभेदत्वस्य समूहे अवयवगतसङ्ख्यारोपवत्त्वम्। चशब्दार्थः साहित्यरूपः समूहो विशेष्यः। अत्र समूहे प्रत्येकावयववृत्तिर्धर्मः प्रवृत्तिनिमित्तम्। समुदायद्वारा अवयवानामपि प्रत्येकं कर्तृत्वादियोग इति तत्तन्निमित्तिका विभक्तिः अवयवेभ्यः भवत्येव। अवयवानां समुदायानतिरेकात्। अवयवाभेदेन इतरेतरयोगे समूहः प्रतीयते। 'चैत्रो मैत्रो यज्ञदत्तश्च गच्छन्ति' इत्यत्र उद्भूतावयवभेदः समूहः चार्थः। स च विशेष्यः। चैत्रमैत्रयज्ञदत्तरूपसमुदायाभिन्नकर्तृनिष्ठो गमनव्यापार इति बोधः।

संज्ञापरिभाषमित्यादिसमाहारद्वन्द्वे तु अनुद्भूतावयवभेदः समूहोऽर्थः इत्येकवचनमेव। अवयवातिरिक्तत्वेन समूहस्य तत्र भानम्। समूहत्वं तत्र प्रवृत्तिनिमित्तम्, न तु प्रत्येकवृत्तिधर्म इति विशेषः॥

प्रति, परि, अभि – इत्यादयः केचन शब्दाः अर्थविशेषे कर्मप्रवचनीयसंज्ञां लभन्ते। तस्याः निपातसंज्ञया अव्ययसंज्ञया च समावेशः। कर्म - क्रियामुक्तवन्तः 'कर्मप्रवचनीयाः'। बाहुलकात् कर्तरि भूते अनीयर्। क्रियानिरूपितं सम्बन्धविशेषमेते द्योतयन्ति। 'कर्मप्रवचनीययुक्ते द्वितीया' (पा.सू. २.३.८) इति सूत्रेण एतद्योगे द्वितीया भवति।

वृक्षं प्रति विद्योतते विद्युत्।

अत्र 'लक्षणेत्थं भूताख्यान.....' (पा.सू. १.४.९०) इत्यादिसूत्रेण प्रतिः कर्मप्रवचनीयः। लक्षणं ज्ञापकम्। वृक्षप्रकाशज्ञानेन विद्युद्विद्योतनं ज्ञायत इति वृक्षो ज्ञापकः। तस्य ज्ञापकत्वं स्वज्ञानद्वारा। ज्ञापकतानिरूपितज्ञाप्यत्वं द्वितीयार्थः। वृक्षस्य वृत्तित्वसम्बन्धेन ज्ञापकतायामन्वयः। ज्ञाप्यत्वस्य आश्रयतासम्बन्धेन धात्वर्थविद्योतनेऽन्वयः। वृक्षनिष्ठज्ञापकतानिरूपितज्ञाप्यताश्रयः विद्युत्कर्तृकविद्योतनव्यापारः – इति बोधः।

अश्वो मां प्रति।

भागेऽर्थे प्रतिः कर्मप्रवचनीयः। भागो नाम स्वत्वाश्रयः। स्वस्वामिसम्बन्धोऽत्र प्रतिद्योत्यो द्वितीयार्थः। मन्निष्ठस्वामितानिरूपितस्वत्वाश्रयोऽश्वः इति बोधः।

वृक्षं वृक्षं प्रति - परि - अनु वा सिंचति।

अत्र वीप्सायां प्रत्यादयः कर्मप्रवचनीयाः। अत्र 'नित्यवीप्सयोः' (पा.सू. ८.१.४) इति द्विर्वचनेन बुद्धिस्थयावत्प्रकृत्यर्थनिष्ठव्याप्यत्वं द्योत्यते। व्याप्यत्वविशिष्टवृक्षादीनां व्यापकत्वसम्बन्धेन क्रियान्वयः प्रत्यादिद्योत्यः। व्यापकत्वं द्वितीयार्थः। व्याप्यवृक्षनिरूपितव्यापकत्ववत् सेचनमिति बोधः। यद्यप्यत्र द्विर्वचनेनैव वृक्षादौ क्रियाव्याप्तिः बुध्यते, तथापि 'परिसिंचति' इत्यत्र षत्वबाधनार्था, सम्बन्धसामान्यविवक्षायां षष्ठीबाधनार्था च कर्मप्रवचनीयसंज्ञा। सेचने व्यापकत्वंच स्वाधिकरणवृत्त्यत्यन्ताभावाप्रतियोगित्वम्। स्वं वृक्षत्वम्।

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वातं विना वृक्षः पतितः ।

विनाशब्दार्थोऽभावः । तस्याश्रयतासम्बन्धेन वृक्षेऽन्वयः । द्वितीयार्थः प्रतियोगित्वम् । वातप्रतियोगिकाभावाश्रयो वृक्षः पतनाश्रयः इति शाब्दबोधः । पतने वातजन्यत्वाभावलाभस्तु आर्थः इति केचित् । अन्ये तु जनकतानिरूपितजन्यत्वप्रतियोगित्वं द्वितीयार्थः । प्रकृत्यर्थस्य सम्बन्धैकदेशे जनकतायामन्वयः । विनाशब्दार्थस्याभावस्य पतथात्वर्थे पतनेऽन्वयः । वातनिष्ठजनकतानिरूपितजन्यत्वप्रतियोगित्वाभाववत्पतनाश्रयो वृक्ष इति बोधः इत्याहुः । अपरे तु विनापदार्थस्य अभावस्य समानकालिकत्वसम्बन्धेन पतनेऽन्वयं वदन्ति । तन्मते वातप्रतियोगिकाभावसमानकालिकपतनाश्रयो वृक्ष इति बोधः ।

पुत्रं विना आगतः पिता ।

अत्र पुत्रशब्दस्य पुत्रकर्तृकागमने लक्षणा । विनाशब्दार्थाभावस्य समानकालिकत्वसम्बन्धेन धात्वर्थागमनेऽन्वयः । पुत्रकर्तृकागमनाभावसमानकालिकागमनाश्रयः पितेति शाब्दधीः ।

विना क्षीरं बालो रोदिति ।

अत्राभावस्य प्रयोज्यतासम्बन्धेन रोदनेऽन्वयः । क्षीराभावप्रयोज्यताश्रयोबालकर्तृकं रोदनमिति बोधः ।

हरिं विना न सुखम् ।

हरिशब्दः हरिभक्तौ लाक्षणिकः । हरिभक्त्यभावप्रयोज्यः सुखाभाव इति बोधः । विनाशब्दार्थोऽभावः स्वविशेष्यतया पदार्थान्तरसाकाङ्क्ष एव प्रतीयते । अत एव चैत्रो न गच्छति इत्यर्थे 'चैत्रस्य गमनं विना' इति न प्रयोगः । एवम् अन्तरा, ऋते इत्यादिशब्दयोगेऽपि ।

अमुं नारद इत्यबोधि सः ।

अत्र तच्छब्देन श्रीकृष्णस्य परामर्शः । अदःशब्देन श्रीकृष्णदृष्टाकृतिविशेषस्य च । इतिशब्दार्थः प्रकारता । तत्र नारदपदार्थस्य आधेयतासम्बन्धेन अन्वयः । प्रथमा तु साधुत्वार्था । प्रकारतायां तादात्म्यं संसर्गतया भासते । अमुम् इत्यत्र द्वितीयार्थः विशेष्यताख्या विषयता । प्रकारतायाः विशेष्यतायाश्च निरूपकत्वसम्बन्धेन बुधधात्वर्थे ज्ञानेऽन्वयः । तथा च तादात्म्यसंसर्गेण नारदनिष्ठप्रकारतानिरूपकं अदःपदार्थनिष्ठविशेष्यतानिरूपकंच श्रीकृष्णनिष्ठं भौतकालिकं ज्ञानमिति शाब्दबोधः ।

तादात्म्यसम्बन्धावच्छिन्नप्रकारतायाः कर्मत्वानुशिष्टद्वितीयार्थकत्वं 'रज्जुं रजतं जानाति' इत्यत्र व्युत्पत्तिवादे भट्टाचार्यैः स्वीकृतम् । अत एव इति शब्देन कर्मत्वस्याभिधानात् नारदपदोत्तरं न द्वितीया । केचित्तु इतिशब्दस्यैव नारद इत्यर्थः । नारदपदं तु तात्पर्यग्राहकम् । इतिशब्दस्य अव्ययत्वात् तदुत्तरद्वितीया लुप्ता । अमुं नारदाभिन्नमबोधीत्यर्थमाहुः । नागेशभट्टैस्तु 'नारद इति' इति

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श्रीकृष्णीयज्ञानाकारानुकरणम् इत्युक्तम् । तन्मते तु आकृतिविशेषनिष्ठविषयतानिरूपकं नारद इत्येतच्छब्दाभिलप्यमानाकारकं श्रीकृष्णनिष्ठं भौतकालिकं ज्ञानमिति बोधः ।

चैत्र इति वदति ।

चैत्रपदस्य 'चैत्रः' इति शब्दोऽर्थः । इतिशब्दः तस्य शब्दपरत्वे तात्पर्यग्राहकः । वदधातोः अभिव्यक्त्यनुकूलमुच्चारणमर्थः । उच्चारणस्य कण्ठताल्वाद्यभिहननरूपो व्यापारः । अभिव्यक्तिश्च विषयतासम्बन्धेन चैत्र शब्दनिष्ठा । चैत्रशब्दनिष्ठाभिव्यक्त्यनुकूलमुच्चारणमिति बोधः ।

चैत्र इति नाम ।

पूर्ववदेव चैत्रशब्दस्य 'चैत्र' इति शब्दोऽर्थः । अभेदः सम्बन्धः । चैत्राभिन्नं नामेति बोधः ।

(रावणः क्रूरः) विभीषणस्तु साधुः ।

तुशब्दार्थो वैलक्षण्यम् । तच्च पूर्वोक्तरावणप्रतियोगिकं बुध्यते । तस्याश्रयतासम्बन्धेन विभीषणपदार्थेऽन्वयः । रावणप्रतियोगिकवैलक्षण्याश्रयो विभीषणः साधुरिति बोधः । अथवा वैलक्षण्यस्य प्रयोजकतासम्बन्धेन साधुपदार्थैकदेशे साधुत्वेऽन्वयः । रावणप्रतियोगिकवैलक्षण्यप्रयोजकसाधुत्ववान् विभीषण इति बोधः ।

यदि रामो वनं गच्छति तर्हि सीतापि गच्छति ।

यदिशब्दार्थः प्रयोजकता । 'रामो वनं गच्छति' इत्यत्र विद्यमानगच्छत्यर्थगमनस्य वृत्तित्वसम्बन्धेन प्रयोजकतायामन्वयः । तर्हिशब्दस्य प्रयोज्यत्वमर्थः । प्रयोजकतायाः निरूपितत्वसम्बन्धेन प्रयोज्यत्वेऽन्वयः । प्रयोज्यत्वस्य द्वितीयशब्दगच्छत्यर्थे गमने आश्रयतासम्बन्धेनान्वयः । अपिशब्दार्थः समुच्चयः । तस्याश्रयता-सम्बन्धेन सीतायामन्वयः । सीता गच्छतीत्यत्र वनमित्यध्याहार्यम् । रामकर्तृकवनगमननिष्ठ-प्रयोजकतानिरूपितप्रयोज्यताश्रयः समुच्चयाश्रयसीताकर्तृकवनकर्मकगमनम् इति बोधः ।

अयं सर्पो रज्जुर्वेति सन्देग्धि ।

एकस्मिन् धर्मिणि विरुद्धनानाधर्मवैशिष्ट्यज्ञानं संशय इत्युक्तम् । 'अयम्' इत्यनेन पुरोवर्ती कश्चित् पदार्थो धर्मी बोध्यते । तस्मिन् सर्पो रज्जुश्चेति परस्परविरुद्धौ तादात्म्यसम्बन्धेन भासेते । समानविभक्तिकनामार्थयोः तादात्म्यं संसर्गः । सर्पो वा रज्जुर्वेति च कोटिद्वयम् । सर्पो वा इत्यत्र वाशब्दार्थो विरोधः । स च रज्जुप्रतियोगिको बुध्यते समभिव्याहारबलात् । विरोधस्य आश्रयतासम्बन्धेन सर्पेऽन्वयः । इतिशब्दार्थः प्रकारता । सर्पपदार्थस्य प्रकारतायाम् आधेयतासम्बन्धेनान्वयः । तथा च रज्जुप्रतियोगिक-विरोधाश्रयसर्पनिष्ठा प्रकारतेति प्रथमकोटेरर्थः । एवमेव रज्जुर्वेति द्वितीयकोटेरप्यन्वयो बोध्यः । प्रकारताद्व-यस्यापि निरूपकतासम्बन्धेन धात्वर्थे सन्देहेऽन्वयः । इदंपदार्थस्य विशेष्यतानिरूपकत्वसम्बन्धेन धात्वर्थसन्देहे अन्वयः । एवंच, तादात्म्यसम्बन्धेन रज्जुप्रतियोगिकविरोधाश्रयसर्पनिष्ठा या प्रकारता, तादात्म्यसम्बन्धेन सर्पप्रतियोगिकविरोधाश्रयरज्जुनिष्ठा च या प्रकारता तदुभयप्रकारतानिरूपकः इदंपदार्थविशेष्यता-निरूपकश्च सन्देहरूपव्यापारः कर्तृनिष्ठः इति शाब्दबोधः ।

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आ मुक्तेः संसारः ।

'आङ् मर्यादावचने' (पा.सू. १.४.८९) इति सूत्रेण मर्यादायामाङ् कर्मप्रवचनीयः । 'पंचम्यपाङ्-परिभिः' (पा.सू. २.३.९०) इति सूत्रेण मुक्तिशब्दात् पंचमी । तं विना मर्यादा । तेन सह अभिविधिरिति वृद्धोक्तिः । अत्र कालरूपा मर्यादा प्रतीयते । कालगतमर्यादात्वंच स्वप्रागभावाधिकरणकालवृत्तिः यः समभिव्याहृतपदार्थः तदनधिकरणत्वम् । अत्र आङर्थो व्यापकत्वम् । पंचम्यर्थो निरूपितत्वम् । मुक्तिपदंच मुक्त्यधिकरणकालप्रागभावपरम् । निरूपितत्वस्य आश्रयतासम्बन्धेन आङर्थे व्यापकत्वेऽन्वयः । व्यापकत्वस्य च स्वप्रतियोग्यवृत्तित्वविशिष्टाश्रयतासम्बन्धेन संसारेऽन्वयः । स्वं - मुक्त्यधिकरणकालप्रागभावः । एवंच, मुक्त्यधिकरणकालप्रागभावनिरूपितस्वप्रतियोग्यवृत्तित्वविशिष्टव्यापकतावान् संसार इति शाब्दबोधः ।

उभयतः कृष्णं गोप्यः ।

उभयशब्दस्य पार्श्वद्वयमर्थः । आद्यादित्वात् सप्तम्यास्तसिः । अधिकरणत्वं तसेरर्थः । तस्य स्वनिरूपिताधेयतासम्बन्धेन गोपीष्वन्वयः । कृष्णपदोत्तरद्वितीयायाः सम्बन्धसामान्यमर्थः । उपपदविभक्तीनां शेषषष्ठ्यपवादत्वात् । कृष्णसम्बन्धिपार्श्वद्वयनिष्ठाधिकरणतानिरूपिताधेयतावत्यो गोप्य इति शाब्दबोधः ।

अन्तरा नन्दं यशोदांच हरिः ।

अन्तरेत्यव्ययं मध्यदेशार्थकमधिकरणशक्तिप्रधानम् । नन्दशब्दोत्तरद्वितीयायाः यशोदाशब्दोत्तर-द्वितीयायाश्च अवधित्वरूपसम्बन्धोऽर्थः । तस्य निरूपकत्वसम्बन्धेन अन्तराशब्दार्थैकदेशे मध्यत्वेऽन्वयः । अन्तराशब्दार्थैकदेशाधिकरणतायाः स्वनिरूपिताधेयतासम्बन्धेन हरावन्वयः । नन्दनिष्ठावधित्वनिरूपित-यशोदानिष्ठावधित्वनिरूपितं यन्मध्यत्वं तद्वद्देशनिष्ठाधिकरणतानिरूपिताधेयतावान् हरिरिति बोधः ।

अन्तरा हरिं न सुखम् ।

अत्र तु अत्यन्ताभावोऽन्तराशब्दार्थः । हरिशब्दः हरिविषयकभक्तौ लाक्षणिकः । द्वितीयार्थः प्रतियोगित्वम् । तच्च अन्तराशब्दार्थेऽभावेऽन्वेति । अभावश्च प्रयोज्यतासम्बन्धेन नञर्थाभावेऽन्वेति । एवंच, हरिभक्तिप्रतियोगिकाभावप्रयोज्यः सुखाभाव इति बोधः ।

हरये नमः ।

उत्कृष्टत्वप्रकारकज्ञानानुकूलव्यापारो नमःशब्दार्थः । स च व्यापारः क्वचित् करशिरःसंयोगादि-रूपः, क्वचित् ईदृशशब्दप्रयोगरूपः । अयं व्यापारः प्रयोक्तृनिष्ठ एव प्रतीयते । अपकृष्टत्वमपि प्रयोक्तृनिष्ठमेव प्रतीयते, शब्दशक्तिस्वाभाव्यात् । चतुर्थ्यर्थः आश्रयत्वम् । अथवा अपकर्षकबोधानुकूल-व्यापारो नमःपदार्थः । अपकर्षो व्यापारश्च प्रयोक्तृगतौ । अवधित्वं चतुर्थ्यर्थः । तस्य निरूपकतासम्बन्धेन अपकर्षेऽन्वयः । हरिनिष्ठावधित्वनिरूपकस्वापकर्ष कबोधानुकूलः स्वव्यापारः इति बोधः । अत्र स्वः प्रयोक्ता । हरिनिष्ठोत्कृष्टत्वप्रकारकज्ञानानुकूलव्यापारः प्रयोक्तृनिष्ठ इति बोधः ।

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एषोऽर्घ्यः शिवाय नमः ।

नमःशब्दार्थोऽत्र त्यागः । त्यागश्च स्वस्वत्वनिवृत्तिपूर्वकपरस्वत्वापादनम् । चतुर्थ्यर्थः उद्देश्यत्वम् । तच्च स्वत्वभागितया त्यागजनकेच्छाविषयत्वम् । नमःपदार्थत्यागस्य विषयताविशेषसम्बन्धेन अर्घ्येऽन्वयः । शिवोद्देश्यकत्यागविषयोऽर्घ्य इति बोधः ।

प्रजाभ्यः स्वस्ति ।

स्वस्तिशब्दस्य मङ्गलमर्थः । सम्बन्धश्चतुर्थ्यर्थः । प्रजासम्बन्धि मङ्गलमिति बोधः ।

स्वस्त्यस्तु गोभ्यः ।

अत्र आशिषि लोट् । आशीश्च शुभाशंसनम् । तस्य विषयतासम्बन्धेन असधात्वर्थे भवने अन्वयः । गोसम्बन्धिमङ्गलकर्तृकमाशीर्विषयभूतं भवनमिति बोधः ।

स्वस्त्यस्तु सर्वजगताम् ।

अत्र 'सर्वजगताम्' इत्यस्य 'अस्तु' इत्यनेन अन्वयः । न तु स्वस्तिशब्देन । अत एव चतुर्थी न । सम्बन्धसामान्ये षष्ठी । स्वस्तिकर्तृकं सर्वजगत्सम्बन्धि आशीर्विषयभूतं भवनमिति बोध इति शम् ॥

(लेखकप्रदत्तं लेखनम्)

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अन्विताभिधानवाद अभिहितान्वयवादयोः भेदः

डि. प्रह्लादाचार्यः

शक्तिग्राहकप्रमाणेषु प्राधान्यं तावत् व्यवहारस्यैव यद्यपि कोशाद्वा व्याकरणाद्वा प्रमाणान्तराद्वा तत्र शक्तिग्रहो जायते, तथापि शास्त्राध्ययनरहितानामपि पामराणां जनानां लोके दृश्यमानत्वात् तेषां च शक्तिग्रहः व्याकरणाद्वा कोशाद्वा न भवति इति कृत्वा प्राधान्येन व्यवहारस्यैव शक्ति ग्राहकत्वं, अत एव शास्त्रकारैः शक्तिः कुत्र इति सिद्धान्ते व्यवहारस्य प्राधान्येन प्रामाण्यं अङ्गीकुर्युः। व्यवहारानुसारेणैव शक्तिग्रहो भवति ॥

परन्तु तत्र बाल्ये वयसि बालानां व्यवहारं दृष्ट्वा तत्र तेषां वर्धनं कथमासीत इति इदानीं अस्माभिः ऊहः कर्तव्यो भवति, अथवा तत्र अनुभवः एव प्रमाणम्। अथापि अनुभवस्यापि प्रामाण्यं साक्षात् न वक्तुं शक्यते। प्रौढाः कामपि सुतरां भाषां आत्मसात्कुर्वन्ति, तदानीं तत्र कथं उत्पत्तिः शक्तिग्रहस्य भवति इति तैः विचारः कर्तुं शक्यते ॥

तत्र व्यवहारे च शक्तिग्रहो जायते। व्यवहारस्तु केवलं पदार्थस्वरूपमात्रे न भवति। अन्वयान्तेन प्रमाणादिभिः लभ्यते यत्र पदानां समभिव्याहारादेव अन्वयः दातुं शक्यते। अतः तत्र अन्वयान्ते शक्तिग्रहः इत्ययं साधयितुं शक्यते। अभिहितान्वयवादिनां इदमत्र समाधानम् - अनन्यलब्धशब्दार्थस्य इति नियम एव चिन्तनीयः। यतो हि गोशब्दस्य कुत्र शक्तिः इति विचारकाले गोत्वमात्रे शक्तिरास्ताम्। गो पदस्य गोत्वे शक्तिः। इदं चिन्तनीयं भवति - यत् शब्देन बोध्यमानः यावान् आर्थो विद्यते तत्र सर्वत्रापि शक्तिः स्वीकार्या ॥

शाब्दबोधे तावत् अशक्यस्य तथा अबोध्यस्य कस्यापि भारं न अङ्गीकरणीयं भवति। अन्यथा प्रत्यक्षेण दृष्टे हस्तः मुरवे एवं स्थापिश्चेत् सोऽप्यर्थः शाब्दबोधे प्रविशतां नाम - इत्यादि प्रतिबन्धीपरिहारार्थं शाब्दवोधः तावत् विषयपूर्वम् इति यावान् विषयः पदैः उपस्थापितः। अतः यदि अन्वयान्ते शक्तिः न अङ्गीक्रियते तत्र अन्वयस्य शाब्दत्वं न स्यात्। अतः अन्वयस्य शाब्दत्व परिरक्षणार्थं अन्वयान्ते शक्तिः स्वीकार्या इति अभिहितान्वयवादिनां समाधानम् ॥

अन्यस्तु आक्षेपः - गामानय इति वाक्ये गोपदस्य कुत्र शक्तिःऌ क्रियान्विते - आनयनान्विते गवि गोपदस्य शक्तिः। एवं आनयनपदस्यापि गवान्विते आनयने शक्तिः। एवं च एकेनैव पदेन -

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गोपदेनैव आनयनान्वित गोपदस्य अभिधानात् आनयन पदस्य वैयर्थ्यं, एवं आनयनपदेन गवान्वित आनयनस्य अभिधानात् गोपदस्य वैयर्भ्यं भवति । अतः अभिहितान्वयवादे पदानां वैयर्थ्यं, प्रसङ्गात् - एकस्मिन् वाक्ये एकेनैव पदेन शाब्दवोधो जायते, इतराणि पदानि व्यर्थानि स्युः इति वक्तव्यं भवति ॥

अत्र तावत् वेदान्तिभिः समाधानमुच्यते –

शाब्दबोधविषये यद्यपि नैय्यायिकैः, वैय्याकरणैः मीमांसकैश्च ऊर्जितमस्ति, तथापि इतरैः अपि दार्शनिकैः तत्र तत्र बहवः विषयाः तत्र तत्र उक्ताः सन्ति । पूर्वं श्री रामानुजताताचार्यैरपि उपस्थापितः ॥

अन्योऽयं विषयः इदानीं मया उच्यते - प्राभाकरैः तावत् विशेषान्विते स्वार्थेपदानां शक्तिः अङ्गीक्रियते - विशेषान्विते स्वार्थे इत्यस्य गामनय इति स्थले गोशब्दस्य आनयनान्विते गवि शक्तिः । तत्र गोपदेनैव - आनयनान्वित गो शब्दस्य ग्रहणात् आनयन शब्दस्य वैयर्थ्यमित्यादयः विषयः परन्तु तत्र अन्वयप्रतियोगी विशेषणरूपेण भवितव्यम् । यद्यपि अन्वयार्थेशक्तिः अङ्गीक्रियते, किचिंदन्वित स्वार्थे योग्येन अन्वयप्रतियोगि विशेषे तावात् स्वस्य पदस्य विशेषो नास्ति । अतः गोपदग्रहणे किचिंदन्वितगोः ग्रहणम् । तत्र सः अन्वयप्रतियोगी कः इत्याकाङ्क्षायाम् प्रतियोगि-विशेष उपस्थापनार्थम् आनयनम् बोध्यम् । तथैव आनयनस्थले किचिंदन्वित गोः आनयनम् । आनयनविशिष्ट अन्वयप्रतियोगिनः प्रतियोगिविशिष्ट उपस्थापनार्थं गोपदस्य आवश्यकता भवति । एवं पदानां अन्वये शक्तिः अङ्गीकर्तुं शक्यते ॥

अन्यः आक्षेपः गोशब्दस्य क्रियान्विते गवि शक्तिः, एवं आनयन शब्दस्यापि किचिंत् कारकान्वित गोः आनयने शक्तिः इति । गो पदस्य क्रियान्वित गौः अर्थः । विशिष्टस्य पदार्थस्य कारकान्वितगोब्दस्य विशेषणग्रहणात् । तत्र विशेषणं तु क्रियायाः । क्रियापदस्य बोधः पदान्तरेण न भवति; क्रियापदेनैव एवंच आनयन पदश्रवणद्वा गोपदात् किचिंदन्वित आनयनपदस्य बोधः । एवमेव आनयन शब्दस्य कारकान्विते आनयने शक्तेः अङ्गीकार्यत्वात् , तत्र विशेषणकोटौ कारकस्य निवेशितत्वात् , तस्य चाप्युपस्थापनार्थं कारकपदस्य यावत्पर्यन्तं गोपदः न प्रयुक्तः तावत्पर्यन्तं आनयनपदः तदाश्रितः एव न स्यात् इति अन्योन्याश्रयः इति ॥

सथैव विशेषणविशिष्टस्य ज्ञानं - शब्दस्थले शब्दं तावत् समग्रम् । *न्यायमंजर्यां* - घटस्य कुत्र शक्तिः इत्यत्र घटत्वजातिविशिष्टघटे घटस्य शक्तिः इति उक्तं भवति । प्रथमं विशेषणस्य, अनन्तरं विशेष्यभूतस्य । एवमेव गामानय इतिस्थले अपि ॥

प्रधानं प्रमाणं तावत् अन्विताभिधानमेव । तदेव विशिष्टद्वैतिभिरपि सम्मतम् ॥

(लेखकप्रदत्तं लेखनम्)

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पदार्थः पदार्थेनान्वेति न तु तदेकदेशेन

उमाकान्तभट्टः

I. शाब्दानुभवपरिचयः

शाब्दबोधो नाम पदज्ञानवतः पुरुषस्य वृत्तिज्ञानसहकारेण पदार्थोपस्थितिद्वारा जायमानोऽनुभव-विशेषः। तथाहि - *'नीलो घटः'* इत्यादिवाक्यश्रवणे नीलत्वादिविशिष्टायां व्यक्तौ गृहीतनीलादिपदशक्तिकस्य बोद्धुः पुरुषस्य नीलत्वादिविशिष्टार्थस्मरणद्वारा *'नीलाभिन्नो घटः'* इत्याद्याकारकः परोक्षानुभवविशेषः उत्पद्यते। स एव *'शाब्दबोधः', 'अन्वयबोधः', 'वाक्यार्थबोधः'* इत्यादिपदैर्व्यपदिश्यते तान्त्रिकैः। यद्यपि शाब्दबोधे ह्यनुभूतपूर्वा एव घटादयः पदार्थाः श्रुतपदैः *'एकसम्बन्धिज्ञानमपरसम्बन्धिस्मारकम्'* इति विधया स्वसङ्केतमहिम्नोपस्थापिता भासन्ते ; तथापि पदोपस्थापितानामर्थानां संसर्गस्य नूत्नतया समभि-व्याहारबलतो भानात् तादृशसंसर्गावगाहिपदार्थ-ज्ञानस्य स्मरणाद् भेदः, प्रत्यक्षादिवैलक्षण्यंच। प्रत्यक्षे पदार्थतत्संसर्गाणां सर्वेषामपि नूतनतयैव भानम्। अनुमित्यादौ तु संसर्गमात्रस्य; तदपि व्याप्तिज्ञानादि-घटित्रसामग्र्या इति विशेषः ॥

II. आकाङ्क्षायाः संसर्गभाननियामकत्वम्

पदानुपस्थितस्याप्यन्वयपदवेदनीयस्य संसर्गस्य शाब्दबोधे भावं प्रत्याकाङ्क्षैव नियामिका। तदेवाभिदधे तत्रभवता गदाधरेण *'शाब्दबोधे चैकपदार्थेऽपरपदार्थस्य संसर्गः संसर्गमर्यादया भासते'* इति। संसर्गमर्यादा संसर्गभाननियामिकेत्यर्थः। सा त्वाकाङ्क्षैव। आकाङ्क्षा हि पदसमभिव्याहारः। यत्पदस्य यत्पदव्यतिरेकप्रयुक्तः तात्पर्यविषयशाब्दबोधजनकत्वाभावः तत्पदेऽव्यवहितपूर्वत्वाव्यवहितोत्तरत्वान्यतर-सम्बन्धेन तत्पदवत्त्वं तत्पदे तत्पदस्याकाङ्क्षा इति तु निष्कर्षः। घटमानय इत्यादिवाक्येषु *'घट + अम्'* पदयोः आङुपसृष्टणीञ्-धात्वाख्यातयोश्च आकाङ्क्षा समस्ति। तथा हि - घटपदस्य अम् पदाभावे तात्पर्यविषयीभूतस्य घटनिष्ठकर्मत्वस्य बोधं प्रति जनकत्वं नोपपद्यते। तस्मात् घटपदे स्वाव्यवहितपूर्वत्व-सम्बन्धेन अम् पदवत्त्वम्, अम् पदे स्वाव्यवहितोत्तरत्वसम्बन्धेन घटपदवत्त्वं वा आकाङ्क्षा। एवमेव *'नीलो घटः'* इत्यादावपि वाक्ये स्वान्तनीलादिपदस्य स्वान्तघटादिपदाभावे तात्पर्यविषयनीलाद्यभेदबोधजनकत्वं दुर्लभमेवेति स्वान्तनीलादिपदे स्वाव्यवहितपूर्वोत्तरत्वान्यतरसम्बन्धेन घटपदवत्त्वम्, नीलघटपदयोः स्वान्तत्वं वा आकाङ्क्षा।

आकाङ्क्षया शाब्दबोधे भास्यः पदार्थयोस्संसर्गः क्वचिदभेदः, क्वचिच्च तदतिरिक्त-आधाराधेयभावादिः ॥

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III. पदार्थः पदार्थेनेति व्युत्पत्तेरवतरणम्

शक्तिज्ञानसचिवेन पदज्ञानेनोपस्थापितस्यार्थस्य पदार्थान्तरेण संसर्गे शाब्दबोधेनावगाह्यमान एव *'पदार्थः पदार्थेनान्वेति न तु तदेकदेशेन'* इति व्युत्पत्तिरवतरति। व्युत्पत्तिर्नाम कार्यकारणभावः। *'व्युत्पन्नः पुरुषः' 'व्युत्पन्नोऽयं शब्दः', 'व्युत्पन्नो घटः', 'अन्योन्याभावस्य साध्यवत्त्वावच्छिन्न प्रतियोगिताकत्त्वं व्युत्पत्तिबललभ्यम्'* इत्यादिप्रयोगषु व्युत्पत्तिपदस्य यथासंख्यं विलक्षण (कार्य-कारणभाव) ज्ञानप्रति-सन्धीयमानसार्थकप्रकृतिप्रत्ययविभागवत्वजन्यत्व-समभिव्याहारलक्षणाकाङ्क्षादिरूपार्थबोधकत्वेऽपि प्रकृते कार्यकारणभावसमर्पकत्वस्याभ्युपगमात्॥

IV. व्युत्पत्तेरस्याः विवरणम्

पदार्थः पदार्थेनेति नियमस्य, पदार्थः - पदजन्यप्रतीतिविशेष्यः; पदार्थेन - पदजन्यप्रतीतिविशेष्येण साकं अन्वेति - अन्वयं भजते - अन्वयप्रतियोगी भवतीत्यर्थः। *'शुक्लः पटः'* इत्यादिवाक्ये प्रयुक्ते, शुक्लपदेन शुक्लत्वविशिष्टस्य पटपदेन पटत्वविशिष्टस्य चार्थस्य स्मरणे सति, शुक्लपदजन्यप्रतीतिविशेष्यः शुक्लत्वविशिष्टोऽर्थः पटपदजन्यप्रतीतिविशेष्ये पटत्ववति धर्मिणि अभेदान्वयं प्राप्य शुक्लत्ववदभिन्नः पटत्ववान् इत्यादिपदाभिलप्ये शाब्दबोधे भासते; न तु पटपदजन्यप्रतीतिप्रकारीभूते पटत्वरूपधर्मे अन्वयं प्राप्येति नियमस्यान्वयः॥

V. पदार्थः पदार्थेनेति नियमस्य फलम्

फलन्त्वस्य नियमस्य, घटत्वे तादात्म्येन नित्यत्वान्वयतात्पर्येण *'नित्यो घटः'* इत्यादि-प्रयोगाणां वारणमेव। तथा हि - जात्यात्मनो घटत्वस्य प्रागभावप्रतियोगित्वसमानाधिकरणंध्वंसाप्रतियोगित्वरूपनित्यत्वेनान्वये बाधाभावात् *'नित्यपदोपस्थापिततादृशनित्यत्ववतः घटपदार्थैकदेशे घटत्वे तादात्म्येनान्वयो भवतु'* इति तात्पर्येण *'नित्यो घटः'* इत्यादिप्रयोगः स्यात्! परन्त्वीदृशप्रयोगाः प्रामाणिकप्रवक्तृपरम्परया नाभ्युगताः। अतस्ते वारणीयाः। शास्त्रस्य हि द्विविधं कृत्यम्; प्रामाणिकप्रयोगपरिरक्षणम् अप्रामाणिकप्रयोगपरिवर्जनंचेति। तस्मात् *'पदार्थः पदार्थेनान्वेति न तु तदेकदेशेन'* इति नियमोऽङ्गीकार्यः। तदात्वे, तादृशनित्यत्वस्य घटपद-जन्यप्रतितिविशेष्ये घटत्ववति धर्मिण्येवाभेदेनान्वयो व्युत्पत्तिसिद्धः; स तु सावयवस्य घटस्यानित्यत्वाद्बाधित इति योग्यताभावादेव शाब्दबोधानुत्पत्त्या ईदृशप्रयोगा वार्यन्ते।

ननु *'पदार्थान्तरनिष्ठप्रकारतानिरूपितविशेष्यतासम्बन्धेन शाब्दबोधं प्रति अन्वयितावच्छेदकरूपेण पदार्थोपस्थितिः कारणम्'* इति नियमेन नीलादिपदार्थस्य अन्वयितावच्छेदकीभूतघटत्वादिपुरस्कारेणोपस्थिते घटादिपदार्थे एवान्वयो भवति न तु तदेकदेशभूतघटत्वादौ ; तस्य जातित्वेन स्वरूपतो भानात् , अनुल्लिख्यमानजात्यखण्डोपाध्यतिरिक्तानामेव किचिंद्धर्मपुरस्कारेण भानमित्यङ्गीकारात्। तथा च स्वरूपत उपस्थिते घटत्वादौ कथङ्कारं नित्यत्वान्वयतात्पर्यम् सङ्गच्छताम्? इति चेत् , सत्यम् । अत एव जातिमत्पदार्थैकदेशभूतायां जातित्वेनोपस्थितायां जातौ नित्यत्वान्वयतात्पर्येण *'नित्यो जातिमान् घटः'* इत्यादिप्रयोगाणां वारणार्थं *'पदार्थः पदार्थेन.'* ... ... इति व्युत्पत्तिरङ्गीकार्यैव। किंचैतन्नियमानङ्गीकारे लोमादौ पदार्थांशे दीर्घत्वान्वयतात्पर्येणानिष्टस्य *'दीर्घः पशुः'* इत्यादिवाक्यस्य को निवारयिता?

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व्युत्पत्तेरस्या असौ निर्गलितोऽर्थः - '*यस्मिन् पदार्थे बोधविषयतात्वावच्छिन्नप्रकारतानिरूपितभगवदिच्छीयविशेष्यता आश्रयतासम्बन्धेन वर्तते तस्मिन्नेव पदार्थान्तरस्यान्वयः नान्यत्र*' इति ॥

VI. व्युत्पत्तेरस्याः सङ्कोचः

सम्पन्नो व्रीहिः' इत्यनेकव्रीहितात्पर्यके शिष्टसम्प्रतिपन्नप्रयोगे व्रीहिपदार्थैकदेशेन साकं सुबर्थैकत्वसंख्याया अन्वयोऽनायत्या स्वीकार्यः सम्पत्त्यन्वितव्रीहिव्यक्तीनां बहुत्वादिति पदार्थः पदार्थेनेति नियमस्य संख्येतरत्वेन सङ्कोच आवश्यकः। एवं चैत्रस्य गुरुकुलम् इत्यादिनियतसाकाङ्क्षस्थले, '*गभीरायां नद्यां घोषः*' इत्यादिलाक्षणिकस्थले च एकदेशान्वयस्यानुभवसिद्धत्वेन नायं प्रसरति।

TC 9226

एवमेव '*घटशून्यम्*' इत्यादौ शून्यपदस्य अभाववदर्थकतया तदेकदेशेऽभावे एव घटत्वावच्छिन्नत्वप्रतियोगिताकत्वसंसर्गेण घटपदार्थस्यान्वयान्नियमोऽयं सङ्कोचनीय एव । सङ्कोचितस्य नियमस्येदं फलितम् – पदार्थैकदेशे पदार्थान्तरस्य तादात्म्येन नान्वयः स्वीक्रियते, भेदसम्बन्धेन तु स्वीक्रियते इति ॥

पुस्तकालय गुरुकुल कांगड़ी विश्वविद्यालय

(लेखकप्रदत्तं लेखनम्)

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